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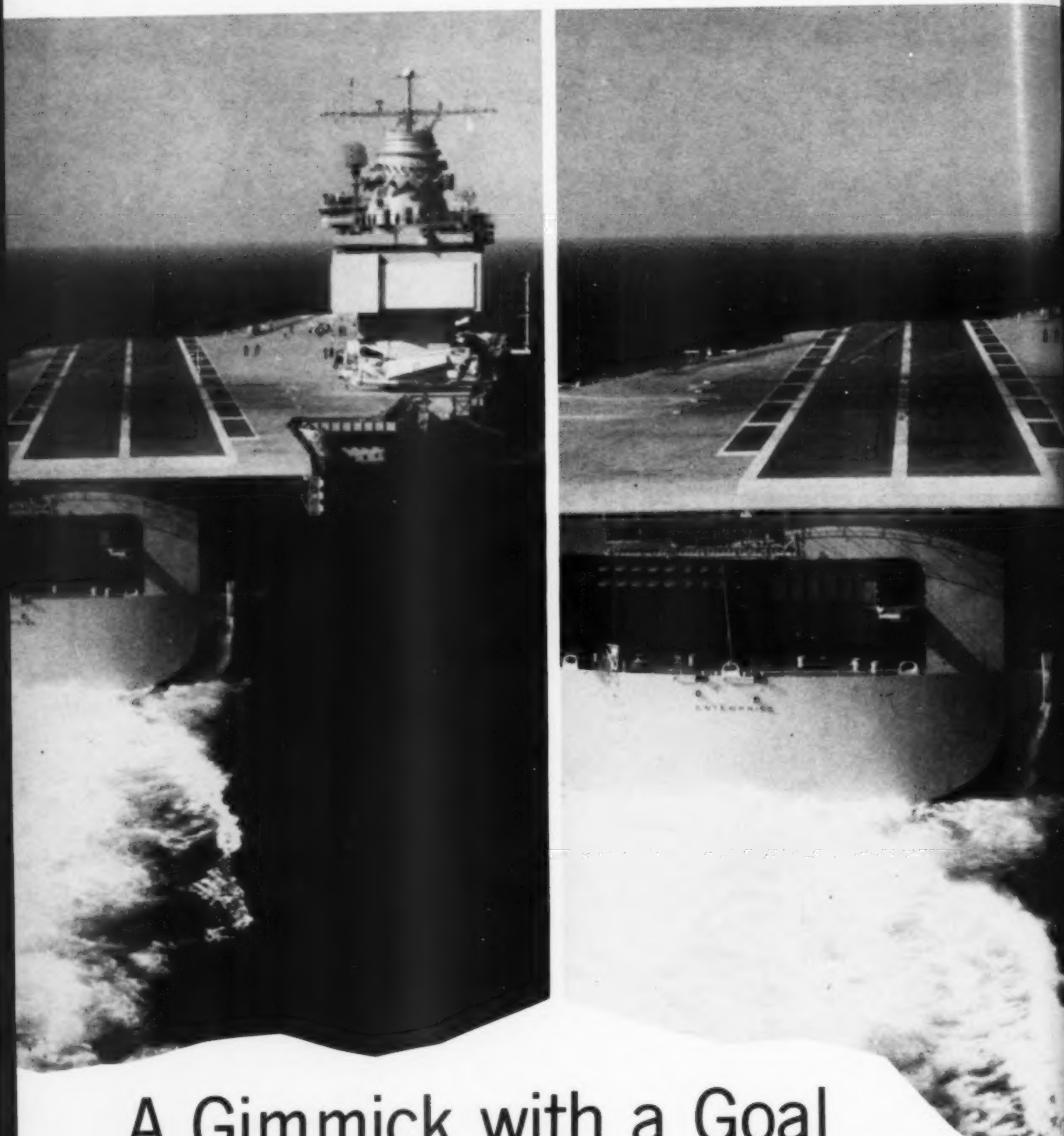
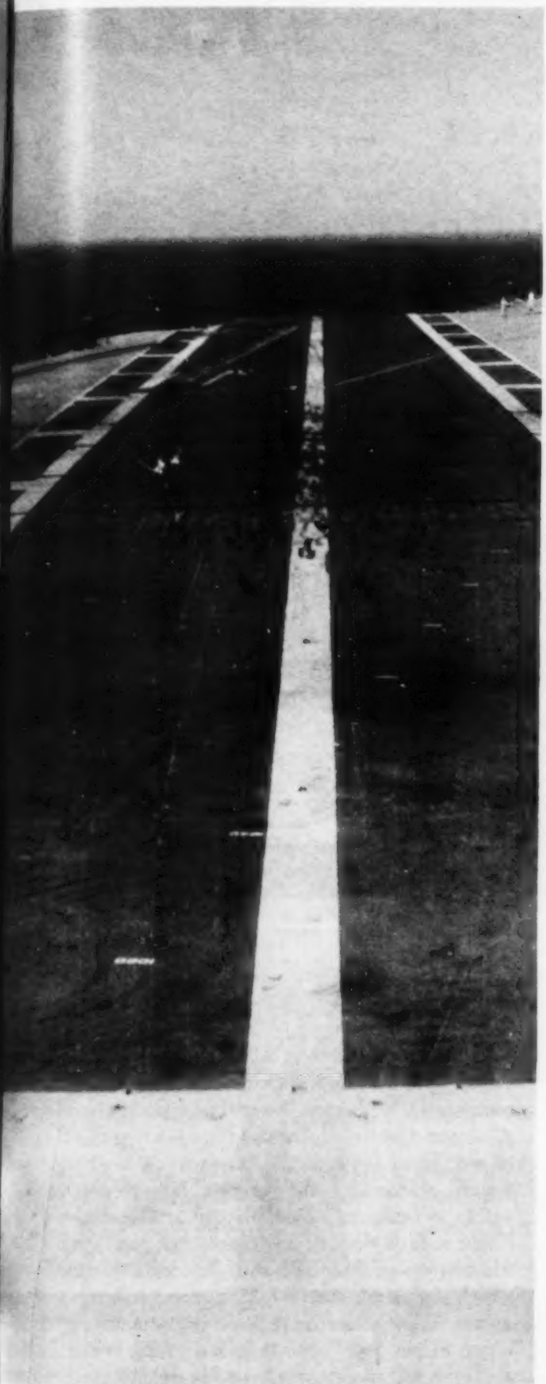


A Gimmick with a Goal

By LT C. Wayne Bennett
LSO, VF-143



By far the most precise and demanding evolution regularly performed in high performance aircraft is the carrier landing. No other maneuver requires such precise control, simultaneously, of an aircraft's speed, heading, altitude, attitude and sink rate as does this one. It should not be surprising, then, that no other maneuver so frequently exceeds the capabilities of both man and machine as does the carrier landing.

In fiscal year 1965 carrier *type* aircraft were involved in 389 accidents in all phases of flight. Of these accidents 214 occurred "on the beach" while flying over 1.7 million hours, for an accident rate of 1.24. The remaining 175 accidents occurred while flying slightly less than ½ million hours from carrier bases, for an accident rate of 3.77. This is just over three times the shore-based accident rate. Furthermore, 86, or nearly half of the 175 carrier based accidents occurred in the landing pattern, or more specifically, during the landing or waveoff phase of flight. Of these 86, 48 (55%) involved the pilot as primary cause factor. Thus, pilot factor during carrier approaches was the cause of over 12% of the fiscal year 1965 naval aircraft accidents involving *carrier type aircraft*. This includes the training command, the reserves, and all shore activities operating carrier capable aircraft, and 12% represents a healthy chunk of the total to be attributed to a single cause factor (pilot factor) in a single evolution (the carrier landing).

The human factor in aviation has been the subject of increasing study since the days of the open cockpit and the silk scarf. This treatise has nothing new and radical to add to the reams which have been written on this topic. It does, however, endeavor to examine a method or "gimmick" for improving carrier landing proficiency within the squadron.

The gimmick involved is a *complete* visual display depicting the carrier landing performance of each squadron pilot in such a manner that he can quickly compare his monthly performance with that of every other pilot in the squadron, and with his own past performance.

The proficiency developed by an aviator, like that of an athlete, depends to a great extent upon moti-

Editor's Comment: The visual display method discussed here is a recognized aid to achieving carrier landing proficiency. Some squadron commanders prefer to have the LSO keep similar information in a loose-leaf binder. If you have a better system, send it in to inform others.

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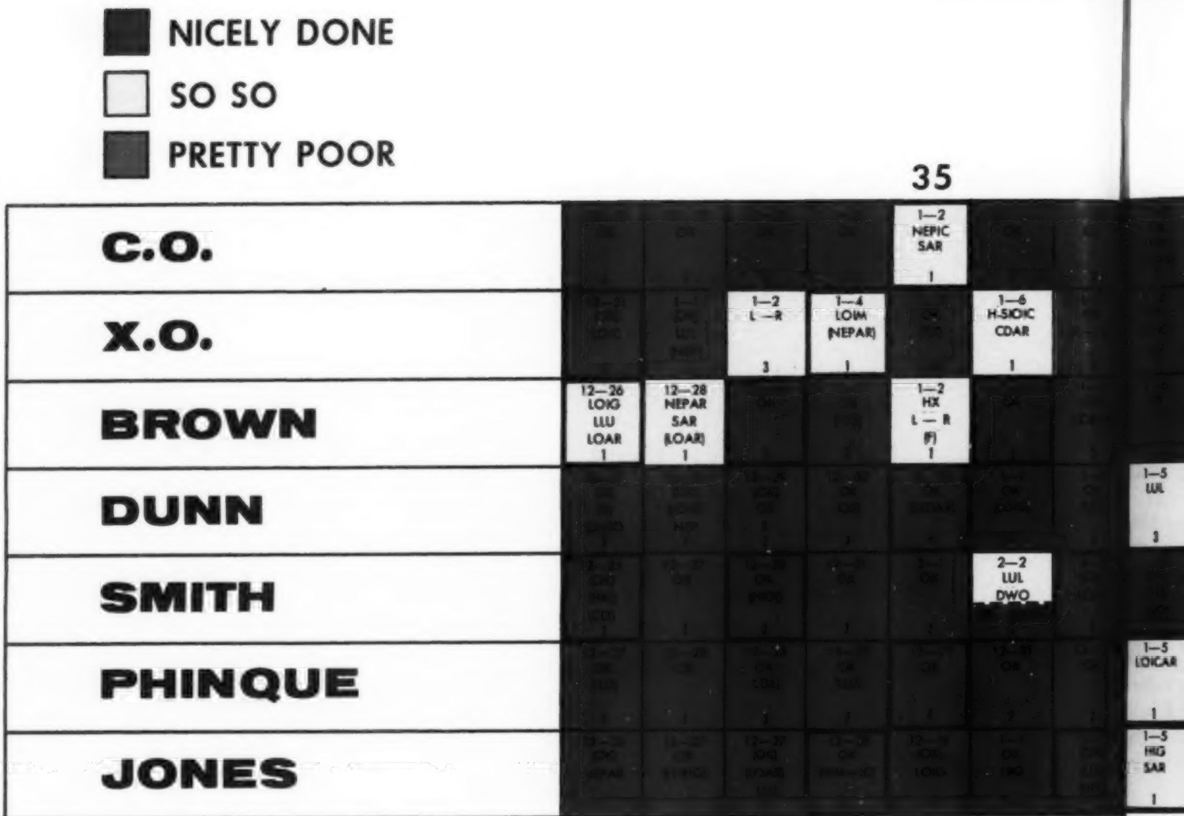

FIG

vation. It may be argued that we are all reasonably well motivated toward preserving our hides and our machines for further use, and that being what we are, we take a modicum of pride in our stick-and-throttle abilities. Ergo, carrier aviators are a well-motivated class of people. Perhaps, but being human, and priding ourselves in our airmanship, we tend to forget our less painful mistakes soon, and frequently delude ourselves out-right concerning our performance.

A visual display of each pilot's performance, analyzed in some detail, tends to dampen this sort of rationalization, and carrier landing performances comparatively charted leave little opportunity for self-delusion. Properly conceived and accurately maintained, such a visual display can accomplish much toward improving the carrier landing techniques within a squadron. Even the pilot who actively belittles such a display as a waste of time and effort will not content himself with just looking at a chart which flatly says that Joe Phinque is a better carrier aviator. Most pilots react positively and try harder in order to put Joe Phinque in his proper place before the eyes of all hands. Negative reactions, such as

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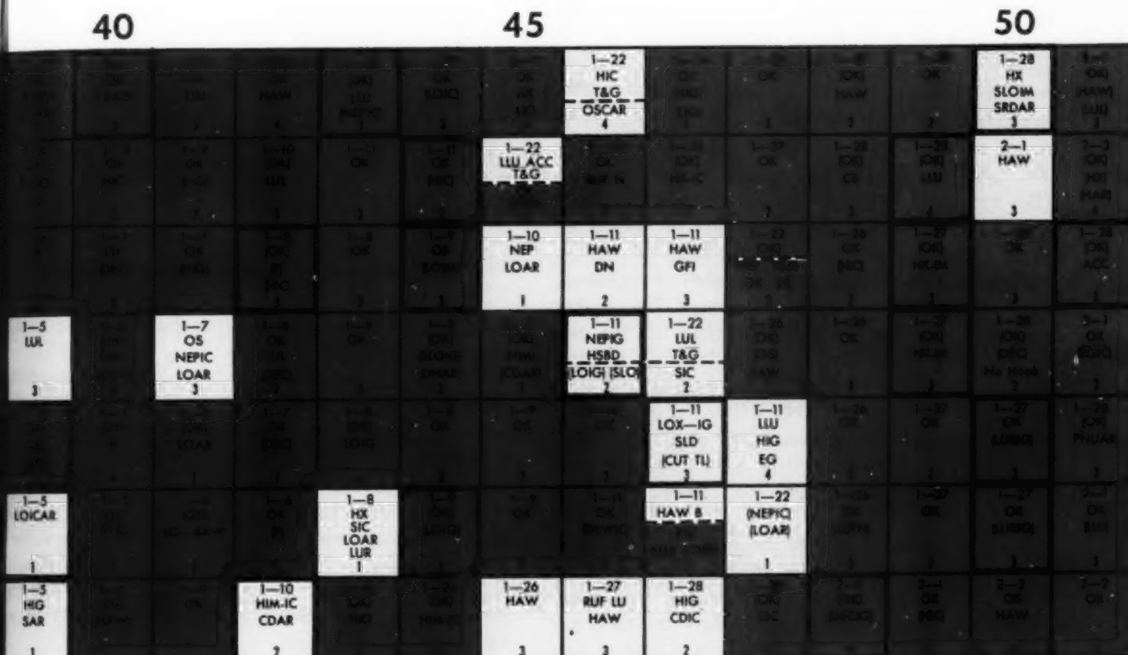
Fig.

CHART

NIGHT HOPS



FIG

tearing the chart down, vilifying the LSO, or jumping over the side are considered leadership problems and will not be discussed further here. Suffice it to say that in either case the chart has gotten the pilot's attention.

The Carrier Landing Trend Chart, or log, Fig. 1, which is now required of carrier-based squadrons is a step in this direction. It does not, however, reduce performance into readily digestible form. It is an important part of the visual display, but a more complete display should also include a statistics sheet, Fig. 2, from which a Carrier Landing Efficiency Rating (so called for want of a better term), is computed, Fig. 3, and a Carrier Landing Efficiency bar graph, Fig. 4, upon which the computed efficiency ratings of all assigned pilots are plotted.

The Trend Chart

The Carrier Landing Trend Chart, Fig. 1, if promptly updated at the secure of each day's air operations, can be a very useful item for scheduling purposes as well as for improving carrier landings. It is in the latter capacity that it is of interest here.

A typical trend chart is probably a myth. The directives requiring such a chart are fairly loose, and

a great deal of latitude is left for originality at the squadron level. The example cited herein is what a trend chart might look like.

Our example trend chart is a reasonably large sheet of cardboard or heavy paper divided into rectangular blocks approximately one inch high and ¾ inches wide. The squadron pilots are listed down the left-hand margin, one pilot to each horizontal row of blocks, and along the top margin every fifth block is numbered 5, 10, 15, 20, etc. to indicate the number of arrested landings. As each arrestment is logged the date is entered at the top of the empty block, followed by a transcription of the LSO's comments concerning the pass. The wire engaged is entered at the bottom of the block and then the entire block is shaded a particular color according to the quality of the pass. In some cases of multiple passes, where a bolter, touch-and-go, or technique waveoff precedes the arrestment the block is divided horizontally into an appropriate number of segments, and one pass is entered in each segment. This makes bookkeeping easier, since the number at the top margin always indicates the number of arrested landings. In order to distinguish between day and night landings a narrow black border is penciled around those blocks representing night landings.

For purposes of shading, the passes are assigned the colors green, yellow, and red according to the following system:

Green—represents an OK or (OK) (fair) pass. Many squadrons assign green only to OK passes, but for purposes of this article, the following philosophy will prevail: a fair pass is one in which the pilot has noted small errors and made timely and proper corrections. This, after all, is the desired end product of carrier training, and therefore OK and fair passes are lumped together and colored green.

Editor's Comment—An LSO consensus is that generally the OK and the (OK) pass are not considered in the same light. The OK is a "green" as described above and the (OK) is a "yellow," as described below.

Yellow—represents a pass that is safe, but in which the technique left something to be desired. These passes are characterized in the LSO's logbook by several comments, none of which indicate a dangerous position, and by the absence of the OK or (OK) notations.

Red—as usual, indicates danger, and hairy techniques will rate red passes. Some philosophy on the red pass: this color should be preserved for those passes displaying dangerous techniques.

To get pilots to fly the meatball to touchdown, values are assigned each wire.

The Statistical Analysis

The statistical analysis is quite straightforward and consists largely of statistics taken from the trend chart on a monthly basis.

Once again the pilots are listed down the left-hand margin and vertical columns are ruled for the following monthly statistics: number of carrier landings, total number of passes, number of green traps, number of yellow traps, number of red *passes* (whether an arrestment resulted or not), a column for each of the wires showing the number of times each was engaged, boarding rate, efficiency rating (which will be explained shortly), and a column for incidental remarks. Each column is further divided into overall, day, and night data.

Statistics broken down in this fashion offer the pilots ready information concerning their performance, and are also handy in answering various inquiries which arise from time to time.

The two quantities which must be computed are the boarding rate and the efficiency rating. The boarding rate is determined simply by dividing the number of traps by the total number of passes made.

The efficiency rating is more complex and is designed to objectively grade a pilot's overall performance, not simply how frequently he gets aboard. An efficiency rating, therefore, should possess the following characteristics:

1. It should grade the general quality of each pass.
2. It should heavily penalize any willingness to press a dangerous approach in hopes of a safe trap.
3. It should encourage flying the ball all the way to touchdown, giving heavier credit for engaging the target wire.

PILOTS INDIVIDUAL CARRIER LANDING ANALYSIS

Period Covered From 1 Jan To 31 Jan	Total Traps		Total Passes		Green Traps Total		Yellow Traps Total		Red Traps Total		#1 Wire Total		#2 Wire Total		#3 Wire Total		#4 Wire Total		Boarding Rate Overall		Efficiency Rating Overall		Remarks
	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	Day	Night	Day	Night	
C.O.	18		19*		14		5*				2		5		8		3						*1 (Y) T&G
	14	4	15*	4	12	2	3*	2			1	1	4	1	6	2	3	0					
X.O.	19		20*		16		4*				2		5		10		2						*1 (Y) T&G
	15	4	16*	4	13	3	3*	1			1	1	4	1	10	0	2	0					
BROWN	19		20*		15*		5				2		7		10		0						*1 (G) T&G
	14	5	15*	5	[illegible]	5	5	0			2	0	6	1	6	4	0	0					
DUNN	17		19*		13		2				1		8		8		0						*1 (Y) T&G
	14	3	15*	4	11	2	1	1			1	0	7	1	6	2	0	0					
SMITH	18		19		16		2				2		8		6		2						
	14	4	15	4	13	3	1	1			1	1	7	1	4	2	2	0					
PHINQUE	14		16*		11*		4				5		3		6		0						1 (G) HS BLTR
	11	3	13*	3	9*	2	3	1			3	2	2	1	6	0	0	0					
JONES	13		13		8		5				1		4		8		0						
	9	4	9	4	[illegible]	[illegible]	3	2			0	1	2	2	7	1	0	0					

Fig. 2

4. The boarding rate should be a definite factor, but not to the point of fostering get-aboard-itis.

Any system of values may be used to determine an index such as the carrier landing efficiency rating. The requirement is to comprehensively describe a pilot's performance. The following system, although somewhat complex, seems to be very workable. It should be borne in mind that the method offered here is merely a suggestion; any number of others would work equally well.

Working from the trend chart color code, green traps are assigned a value of two points, yellow traps one point, and, in order to discourage dangerous tendencies, anything red (passes or traps) will rate a minus three points.

Next, in order to get the pilots to fly the ball all the way to touchdown, values are assigned to each of the wires. The wires are, in the order of their displacement from the desired hook touchdown point, 3-2-4-1, and the values assigned should diminish in

PILOTS INDIVIDUAL CARRIER LANDING ANALYSIS

Period Covered From 1 Jan To 31 Jan	Total Traps		Total Passes		Green Traps Total		Yellow Traps Total		Red Traps Total		#1 Wire Total		#2 Wire Total		#3 Wire Total		#4 Wire Total		Boarding Rate Overall		Efficiency Rating Overall		Remarks
	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	D	N	Day	Night	Day	Night	
C.O.	18		19*		14		5*				2		5		8		3		1.000		.813		*1 (Y) T&G
	14	4	15*	4	12	2	3*	2			1	1	4	1	6	2	3	0	1.000	1.000	.835	.729	
X.O.	19		20*		16		4*				2		5		10		2		1.000		.85		*1 (Y) T&G
	15	4	16*	4	13	3	3*	1			1	1	4	1	10	0	2	0	1.000	1.000	.894	.687	
BROWN	19		20*		15*		5				2		7		10		0		1.000		.854		*1 (G) T&G
	14	5	15*	5	[illegible]	5	5	0			2	0	6	1	6	4	0	0	1.000	1.000	.808	.984	
DUNN	17		19*		13		2				1		8		8		0		.944		.804		*1 (Y) T&G
	14	3	15*	4	11	2	1	1			1	0	7	1	6	2	0	0	1.000	.750	.847	.645	
SMITH	18		19		16		2				2		8		6		2		.947		.820		
	14	4	15	4	13	3	1	1			1	1	7	1	4	2	2	0	.934	1.000	.817	.812	
PHINQUE	14		16*		11*		4				5		3		6		0		.934		.730		1 (G) HS BLTR
	11	3	13*	3	9*	2	3	1			3	2	2	1	6	0	0	0	.927	1.000	.758	.639	
JONES	13		13		8		5				1		4		8		0		1.000		.829		
	9	4	9	4	[illegible]	[illegible]	3	2			0	1	2	2	7	1	0	0	1.000	1.000	.870	.708	

Fig. 3

that order. Therefore the 3 (target) wire is assigned one point; the 2 wire 0.75 points; the 4 wire 0.25 points; and the 1 wire no credit. Hopefully, a lack of credit for the 1 wire will soon have the deck spotters flying the ball to a 2 or 3 wire rather than just being satisfied with getting aboard.

Thus far, it will be seen that the maximum number of points available per pass is 3, given for a green 3 wire, and that the minimum could be a minus 3 for a red technique waveoff, bolter, or one-wire.

Now to compute the efficiency rating, add up the points earned over a given period and divide by the maximum points that would have been possible for this period. In other words, divide by three times the number of approaches attempted during the period in question, since theoretically, 3 points are possible each time the pilot calls the ball. This effectively enters the boarding rate as a factor in the efficiency rating, while not penalizing bolters and waveoffs to the extreme.

In formula form the efficiency rating would read like this:

Efficiency Rating =

$$\frac{2G + Y - 3R + (3W) = .75(2W) + .25(4W)}{3TP}$$

Where: G = number of green traps
Y = number of yellow traps
R = number of red *passes*
3W = number of No. 3 wires
2W = number of No. 2 wires
4W = number of No. 4 wires
TP = number of approaches commenced

In order to maintain the pilot's confidence and respect this formula will occasionally require a correction. For instance, a green hook skip bolter or an intentional touch-and-go have a maximum of 2 possible points because no wire is engaged. This correction may be effected either by ignoring these passes entirely, or by using for these passes a factor of 2 (instead of 3) in the denominator of the formula. Such corrections will prove worthwhile when the validity of the formula is occasionally questioned. A good general criterion for the application of a correction is as follows: if the pilot, by timely use of the proper technique should have been able to effect a safe landing, no correction to the formula is warranted.

The Bar Graph

The final portion of the visual display is a simple bar graph comparing, on a monthly basis, the overall efficiency ratings of all squadron pilots. This graph is a quick attention-getter and stimulates considerable interest among the pilots. It may even stimulate a pilot's interest to the extent that he will refer to the sheet of statistics and the trend chart in an effort to determine for himself how his carrier technique may be improved. Our bar graph has the efficiency rating plotted vertically and pilot's name across the bottom. Enough space is allotted to each pilot so that his efficiency rating for each successive month of the cruise can be plotted over his name. This allows one chart to last the entire cruise, and also provides each pilot a look at his own month-to-month trend as well as his performance relative to other pilots.

Having some idea of what the visual display is all about, let's go back to Joe Phinque, boy aviator, and analyze his carrier landing performance for the month of January 1966. The trend chart on Joe's landings look like Fig. 1.

Tabulated on the statistics sheet the same information appears as in Fig. 2.

Computing the boarding rate from the statistics sheet, (Fig. 2) we find that Joe made 13 day passes for 11 traps and 3 night passes for 3 traps for total figure of 16 passes and 14 traps. However, it will be noted from the remarks column of the statistics sheet that one of the bolters was an OK hook-skip. Discarding this pass for purposes of the boarding rate the figures become:

Day .... $\frac{11}{12} = .917$

Night .... $\frac{3}{3} = 1.000$

Total .... $\frac{14}{15} = .934$

These figures are then entered into the boarding rate column of the statistics sheet.

Proceeding to the efficiency rating the following computations follow:

	Day	Night	Overall
2G	18	4	22
Y	3	1	4
-3R	0	0	0
(3W)	6	0	6
.75(2W)	1.5	0.75	2.25
.25(4W)	0	0	0
Total points earned	28.5	5.75	34.25
Total points possible	38*	9	47

*It will be noted that the OK hook-skip bolter is counted in the efficiency rating, but that it is counted as a 2 point pass, hence the maximum day points possible are 38 (and not 39) and the maximum overall points possible are 47 (instead of 48).

Dividing the points earned by the points possible:

CARRIER LANDING EFFICIENCY

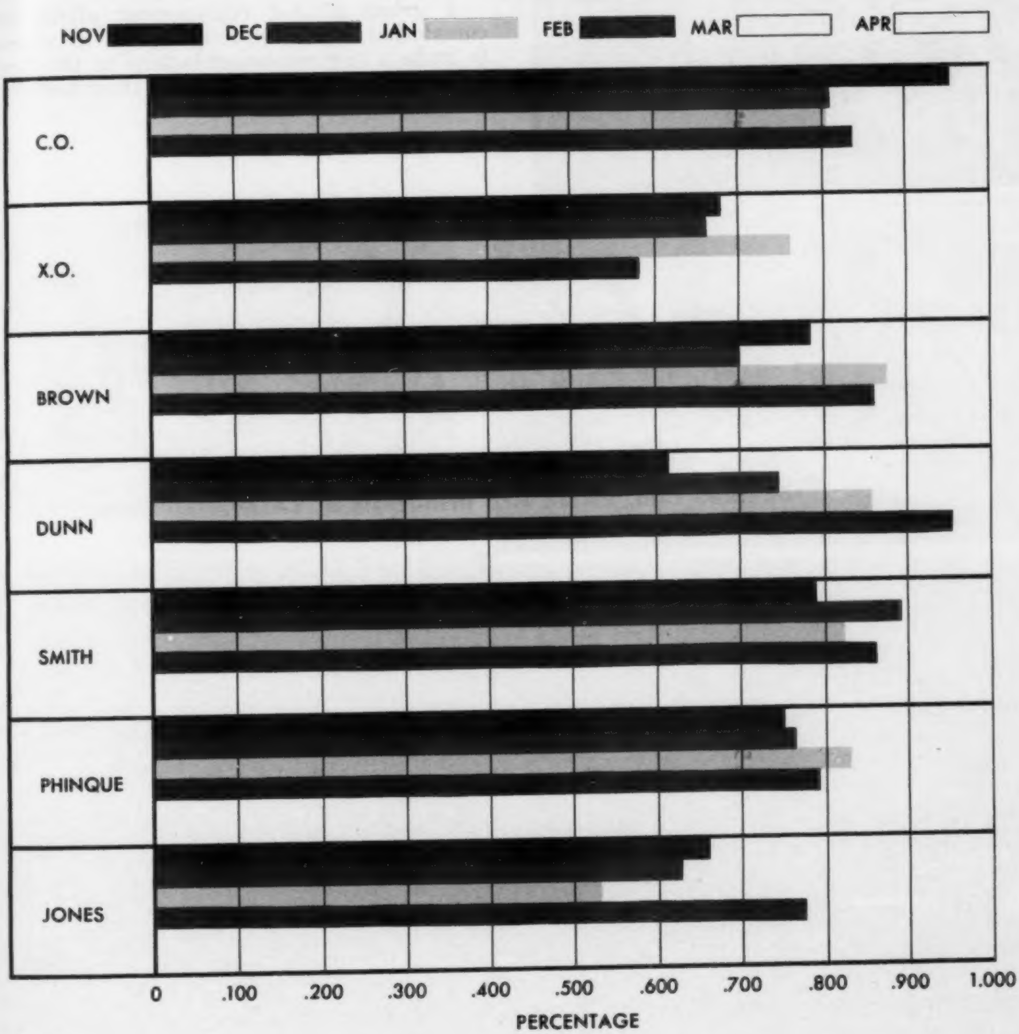


Fig. 4

Day .... $\frac{28.5}{38} = .750$

Night .... $\frac{5.75}{9} = .639$

Overall .... $\frac{34.25}{47} = .729$

These then, are the efficiency ratings. Enter them in the appropriate columns of the statistics sheet (Fig. 3), plot the overall ratings on a bar graph (Fig. 4), post the whole package on the bulletin board near the trend chart, and then stand back and see if the interest generated is worth the effort expended.

A group of A-4 replacement pilots, just completing RAG training, pause a moment to make a few recommendations to the newly designated aviators who follow their footsteps.

As We See It

By Class 1-66, VA-44 and Instructors of VA-44

So you've just pinned those wings on. Congratulations. It's been a long hard road, hasn't it?

Chances are, with orders assigning you to a CRAW (still referred to as RAG), you're wondering just what to expect. What sort of an outfit is it? What sort of advice would a group of replacement pilots about to complete their training care to pass on to someone just starting?

As with any command, the RAG has a mission, and that is to deliver to the fleet a pilot that is basically qualified in a specific fleet aircraft and its associated equipment. In other words, in the training command you learned basic and advanced fundamentals. Here, you'll specialize in your aircraft, the

missions it is built for, and its equipment. When you leave, you'll be basically qualified and have a good start toward becoming an expert in your field. Your final qualifications, of course, will come later in your fleet squadron.

A big job? You bet it is! That's why the instructors in the RAGs are carefully selected. In VA-44, for example, the Instructor Pilots, called IPs for short have at least one squadron tour under their belts and average about 1100 hours in the A-4. Most of them have from 300 to 400 carrier landings in the airplane. Indeed, a formidable amount of experience.

Upon checking into the RAG, you will be assigned to a class made up of approximately 15 Replacement Pilots, called RPs. (Most will be ensigns and jaygees.) However, you will also find a couple of senior types who are "refreshing" for their second or third squadron tour. Our class took advantage of this rank situation and organized along the lines of a squadron —with a skipper, exec, etc. This worked extremely well and accounted for an unusual amount of class spirit—both professionally and socially.

The first step in the RAG is instrument and survival training. Upon completion you start the NAMO trainer. For an A-4, this amounts to one week of solid classroom study of the basic airplane and its equipment. Instruction is intense and extremely comprehensive.

Occasionally a Replacement Pilot, feeling he's had all this previously, will become complacent and relax a bit. The education facts of life soon become painfully evident when he gets "frapped in the chops"

with a Friday afternoon test. Unfortunately, the same RP usually won't do very well with his emergency procedure quizzes. If carried further, final payment of the bill for complacency could very well take place at 30 thou., or a long green table.

Without exception, the entire class agrees, "know your airplane cold." NATOPS is not a substitute for knowing your systems. When a failure occurs you must know your systems to accurately analyze the situation. Once the failure is analyzed, then apply the appropriate NATOPS procedure(s). This is especially critical if compound failures should occur.

Upon completion of NAMO, the RP can plan to be flying the airplane within about a week. During the few intervening days you'll receive flight support lectures such as course rules, safety briefings, and instrument procedures. An alert RP will also take a few moments to insure that his flight gear is up-to-date and ready to go. Those who have never worn a torso harness before may be surprised at the fitting and modifications required.

During the early days of the FAM stage, things will tend to be a little slow. This is because the senior classes have scheduling priority. Your class will have its turn in a very short time. The important thing is to utilize this time preparing for future flights. Get in the Navigation Planning room and start working out the syllabus sandblower navigation flights. Most of our class had a couple of these flights planned ahead and were ready to go at a moment's notice. Those who didn't? Well, they had a last minute flailex—usually lasting into the wee hours of the day the flight is to be flown.

Speaking of sandblowers, here's where an RP really starts to learn the airplane's performance. Handbook charts and graphs become familiar tools of the trade. You'll treat your fuel like it's gold and figure the route down to the second. A completely finished set of navigation charts and cards are a real work of art, if they are done right—and something that an attack pilot should be proud of.

How about flying a sandblower? Now you put those carefully prepared charts to work for you. Chances are you were introduced to low-level navigation somewhere in the training command—using an altitude of 1000 or 1500 ft. In the RAG you'll fly regular designated sandblower routes in which you are allowed to fly at 200 ft altitude. In getting to 200 ft there are a few navigational changes that will take place. First, at about 600 ft and below you'll notice that things somehow look different. This is because you are looking at objects from the side rather than from above. Also, you can't see

more than a couple of miles horizontally at 200 ft. What this requires is a bit of "checkpoint study"—noting objects with vertical development along the route (i.e., towers, bridges). Crossing over a straight railroad track or road? Take a look down it to see if you can see a city or some other significant landmark.

Another thing that you'll notice is the importance of flying heading, time and speed. Of the three, heading is the most important since it profoundly affects the other two and is the most difficult to adjust for errors. Fly it as precisely as possible. Speed can be adjusted with little trouble to take care of an error in time, provided it isn't too far off.

During these navigation hops you will be chased by an IP who will observe and act as a safety pilot. He will give very little technique instruction in the air. You have a set of Navy wings and he expects you to act like an aviator.

So you get lost on one! Chances are he'll let you go awhile—unless you're wandering into a restricted area or some other hazard. Don't worry about it—admit it to yourself and have a plan for re-orienting yourself. Enroute thunderstorm? Circumnavigate it and pick the route up on the other side. This is bound to get you a couple of "Above Averages" in the old training jacket.

The weapons syllabus of the RAG is perhaps the most enjoyable part of the training and certainly the stage where the RP really begins feeling at home in the airplane. You'll strap the airplane on three times a day for about two weeks. During that time, you'll bomb, strafe and shoot rockets utilizing just about every tactic applicable to the aircraft's mission. First you'll drop practice rockets and bombs and then actual live ammunition (such as zuni and napalm). Upon completion of this phase, you'll be as familiar with the *Skyhawk* as you are with your own car.

The final phase of RAG training is day and night carrier qualifications. Here, you have Field Mirror Landing Practice (FMLP) for about two weeks. The first few periods will be during the day. After that they will all be night periods—with the exception of a one day refresher just prior to going to the ship. Upon completion of this phase your log book will have about 10 day and 6 night carrier landings added to it.

Day FMLP is not much different from what you've had previously (i.e.: mirror, runway, glide slope, pattern, etc.). At night, however, we utilized an outlying field which had a lighted area, approximating the landing deck of a carrier. (The rest of the runway was there and could be instantly lighted in the event of an emergency).

How did this simulated carrier deck work—especially since practically all of the FMLP was at night? Quite well. First, the short centerline length pointed out the need of a pilot working on his lineup. Second, many old-timers tell of the illusion of the short deck suddenly rushing up during the last seconds prior to touchdown. Since everyone experienced the illusion during the night FMLP, it was no problem aboard ship. Third, since the deck lighting was directional and seen only from astern, everyone learned early the importance of flying an instrument pattern. In other words, we learned good procedures and became aware of the size and shape of the deck at night. When returning to day FMLP, it was a piece of cake. The actual Carqual aboard went equally as well.

During your tour at the RAG, you will be assigned to a minimum amount of collateral duties. This is to enable you to concentrate a maximum of attention on the airplane and its mission. Equipment shortages, weather and personnel commitments sometimes require the schedule to be changed at a moment's notice, but don't let this bug you into becoming a griper. Stay flexible—the entire command is doing its absolute best to get you through. Although there is a lot of hard work involved, the flying is enjoyable and something you'll refer to as "the good old days" in the not too distant future.

The most common mistake made by newly designated RPs is overdependence on their instructor or not "getting over the student attitude." Those gold wings give you a certain amount of aviation authority—use it. This doesn't mean that the new ensign is expected to stand up in the middle of an all pilot's meeting spouting aviation expertise. Rather, it means that if your flying in the RAG is such that it requires constant coaching, you are depending too much on the instructor. You will be considered by others, and yourself, as a student. In unusual or unanticipated circumstances, you have the prerogative to choose what to do. By proper preparation for each flight you'll acquire the knowledge and confidence so necessary to develop the ability and skill to do the right thing at the right time. More important, in your own mind, you'll be a Naval Aviator.

SPINNING and WINNING

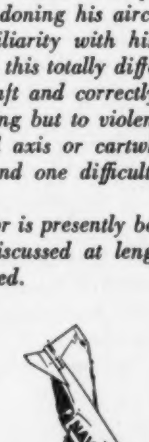
By CDR Merlin L. Johnson

Editor's note—Shortly after receiving this excellent article on spins, the managing editor was invited to the U. S. Naval Test Pilot School, Patuxent River, Maryland for an accelerated course in Spin Training. Commander D. Z. Skalla, Assistant Director of TPS, acted in the capacity of instructor and safety pilot. The Editor, not having intentionally spun a jet aircraft for many years, thoroughly enjoyed the opportunity to participate in this eye-opening flight.

An instrumented T-1A Seastar was utilized for this particular spin indoctrination training flight. Some 10 spins and post-stall gyrations were completed, including various modes of entry into the classic varieties of the normal and inverted spin.

As Commander M. L. Johnson brings out graphically in his article, the post-stall gyration that may ensue in the transitory stage just prior to entering the spin, is indeed a wild ride. Without doubt this violent maneuver could be responsible for the pilot prematurely abandoning his aircraft, based on his, the pilot's, unfamiliarity with his aircraft's highly unusual behavior in this totally different flight regime. Spinning an aircraft and correctly recognizing the situation is one thing but to violently tumble about the aircraft's lateral axis or cartwheel, is an entirely different matter and one difficult to accept as possible.

A new spin movie in color is presently being filmed and many of the items discussed at length by the author will be demonstrated.



Records indicate that stalls and spins, inadvertent or otherwise, are one of the major causes of accidents in military aviation.

From January 1957 to June 1965 over 340 accidents related to out-of-control situations occurred in naval airplanes. Well over one-third of these accidents were pilot caused, yet half of these could have been prevented by proper pilot corrective action.

The most meaningful statistic, however, is that *approximately 50 percent of all accidents involved one or more fatalities*. The cost in lives and equipment is immeasurable but the deleterious effect on combat readiness is quite apparent.

The first lesson to be learned from these macabre statistics is of course, don't end up in an out-of-control situation. But, if the military pilot is to get the maximum performance from his airplane he must, at times, fly it close to the stability limits. The majority of these adrenalin draining situations are inadvertent and most frequently encountered in carrier type airplanes during maneuvering flight.

In order to gain additional first-hand knowledge in this realm of flight, it would be highly desirable for each pilot to experience uncontrolled flight in his particular airplane. However, many airplanes have been restricted from spinning because of aerodynamic design limitations, structural integrity, and marginal recovery characteristics.

Most naval aviators have experienced limited out-of-control flight when they were introduced to spins in the training command; this experience is grossly inadequate to cope with the present day high performance airplane.

The U. S. Naval Test Pilot School introduces the student test pilots to the art and science of spinning both jet and propeller airplanes. It was readily apparent after flights with the various test pilots in training and reviews of accident statistics, that one of the major problems is "pilot orientation," both spatially and in the cockpit.

In the past two and one-half years at TPS one hundred pilots of varied backgrounds and experience flew over one thousand spins under monitored conditions and some interesting results regarding "Pilot Orientation and Response" were observed. Most pilots with little or no experience in spins, commented on the disorienting aspects which often resulted in incorrect control inputs and recovery responses. Some pilots had a tendency to wipe out the cockpit with the control stick, thereby nullifying any possible control response. Inverted flight either transitory or otherwise, combined with excessive side forces resulting from yaw, proved to be the most disorienting of the various conditions encountered. Both pilot orientation and recovery technique improved significantly with increased experience gained through repeated spin maneuvers.

The out-of-control situations in today's modern high performance airplanes result in many different types of unusual gyrations with equally as many names, such as inertia coupled maneuvers, tumbling, horizontal spins, post stall gyrations, etc.

Many factors contribute to airplane behavior when entering this flight condition such as: altitude, airspeed, acceleration, configuration, control positions, weight, trim, stability augmentation, CG location, etc. One of the major factors contributing to the airplane's cantankerous actions is mass distribution about the axis of the airplane with respect to the center of gravity. The airplanes of yesteryear displayed the classic spin characteristic because the mass was fairly well distributed about all the axes, (Fig. 1) but the present day airplane is fuselage loaded with the mass primarily oriented within the long dense fuselage. This is principally due to the size, location, and weight of the jet engine and design of high speed wings.

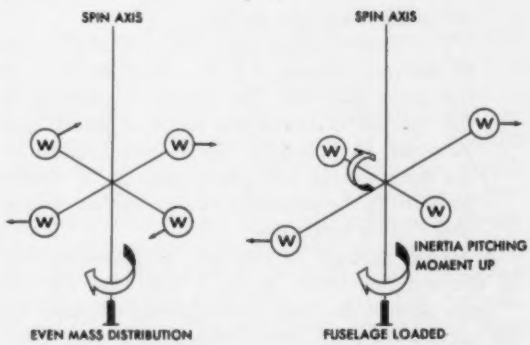


Fig. 1

The mass loading of an airplane and, therefore its spin characteristics, are readily changed when carrying ordnance or drop tanks on the wing stations. For example, the *Skyraider* readily recovers from a spin in the clean configuration; however, with a heavy load of ordnance on the wing stations it is extremely

difficult to recover because the spin becomes very flat and results in the loss of rudder effectiveness.

The A-6A *Intruder* has excellent spin and recovery characteristics, but its actions will change markedly with wing loading. The A-4 *Skyhawk* spin characteristics and recovery procedures are also different with and without wing stores. Thus every carrier bird in the Navy's inventory can be considered to exhibit these marked recovery differences, varying as to ordnance, tanks, etc.

The various phases of a spin may be separated into behavior patterns; *incipient, steady state, and recovery phases.* The post-stall gyration is not to be considered as a phase of the spin proper but may, however, lead into one of the classic phases. One thing that is common to all spin phases is some form of rotation about a vertical or vertically inclined axis.

> The first phase, called the "*incipient*" phase, occurs when the aerodynamic forces and the moments of inertia are seeking to balance. This phase may vary in duration and can be accompanied by violent pitching and yawing.
>
> The *steady state* spin occurs when these forces equalize and the rate of rotation about the spin axis is constant. The angle of attack, yaw rate and airspeed also tend to remain fairly constant. Of some significance is the somewhat disconcerting fact that some airplanes may never enter the steady state spin phase.
>
> The *recovery phase* begins with the application of recovery controls, but the exact duration of this phase may vary. The correct application of the controls decreases the angle of attack and yaw rate. A noticeably disconcerting factor to the pilot during this phase may be a violent increase in the rotational rate as airplane moves closer to the spin axis.

A classic example of this sort of maneuver can be demonstrated nicely in the T-28B. (See Fig. 2)

Some present day high performance airplanes do not readily enter the classic phases of a spin. They generally enter into an out-of-control maneuver called a post-stall gyration, which is nearly impossible to describe in aerodynamic terms because of the airplane's inconsistent and often violent actions. The pilot once having entered this flight realm intentionally or otherwise, is just along for the ride. The F-7U *Cutlass* will long be remembered as an airplane that exhibited this type of maneuver and further defied convention by refusing to enter the classically defined phases of a spin. Some airplanes will produce a post-stall gyration prior to entering a spin and some will display it only under certain entry conditions.

SPIN CHARACTERISTICS

Spin entry consists of an abrupt roll or snap in the direction of the applied rudder. The nose of the airplane drops sharply during the first half of the turn, then returns to the horizon during the completion of the first turn.

Nose drops during first half of second turn, then rises to approximately 25 degrees below horizon upon completion of turn.

Nose drops during first half of third turn, then rises to approximately 35 degrees below horizon upon completion of turn.

A stabilized spin, with the nose remaining at approximately 45 degrees below the horizon, develops after the third turn.

RECOVERY APPLIED

When recovery control is applied, the nose of the airplane drops and the spin accelerates for approximately one-half to one turn. Then the spin stops abruptly within an additional one-half turn, with airplane in approximately a 70-degree dive.

Approximately 500 feet altitude is lost per turn.

Fig. 2

The T-1A for example, will only produce a post-stall gyration from extremely nose high attitudes while the T-28 never displays this tendency, but rather enters directly into the incipient phase of a spin. A post-stall gyration may lead directly into an inverted spin but the one characteristic that seems to be consistent with this maneuver is the violent appearance to the pilot.

A situation that often occurs in maneuvering flight that may result in a hair raising, seat grabbing post-stall gyration, is the classic *yaw-roll coupling*. The coupling maneuver may be experienced during a slow speed reversal or a tail chase with a nose high rolling maneuver, as excessive positive G and top rudder are generously applied to the bird. When the airplane stalls . . . *things happen rather rapidly*. The airplane rolls in one direction and yaws in the other creating a combination of disorienting pitches and yaws. Extremely high roll and yaw rates are possible and inverted flight attitudes are frequent. The F-8 *Crusader* is particularly noted for this variety of wild ride, just prior to entering a spin. Further, remember that *the Crusader will only spin erect*. In some airplanes this maneuver may end up in an inverted spin, such as the British *Hawker Hunter* while the T-1A usually spins inverted from the yaw-roll coupling entry with the *stick full aft*.

If the pilot ends up in a post-stall gyration he will generally experience side forces and rapid changes in them—more so than pitching moments. Side forces are not only uncomfortable, but may be extremely vertigo inducing. Steep spins or spirals are generally more rapid in rotation rate, and sometimes visually disorienting to the pilot, with respect to determining in which direction the airplane is actually spinning.

If the spinning becomes excessively steep the pilot may have difficulty in determining whether the airplane is in an inverted or an erect spin.

A phenomenon that is very disorienting and slightly uncomfortable, more native to the naval pilot than other services, is the blues; that is, blue water below and blue sky above.

Instrument conditions are of course the most critical. Rapid changes in acceleration confuse his seat-of-the-pants orientation, particularly if some phase of inverted flight is involved. The position in which the pilot is holding the controls at the time of entry may only serve to further confuse him as to what the airplane is actually doing.

What can be done to get the pilot out of this mess? The answer is very simple, at low altitudes—*eject!* The high altitude situation where time and maneuvering airspace is not as great a problem is different. The multifactors involved and the variety of present day airplanes preclude a concrete formula for recovery from an out-of-control situation. NATOPS for the particular model gives the best information for recovery and should be studied and thoroughly understood. Often, a seemingly out-of-control condition can be corrected by flying the angle-of-attack Alpha, that is decrease Alpha if erect, increase Alpha if inverted and maintain an angle-of-attack out of the stall region. *In general do not use aileron or rudder until fully recovered from the stall.* Avoid or recover from the stall and you avoid the spin. Recovery from the erect spin situation usually necessitates a G load less than the normal comfortable one G, but never less than zero G. When inverted, negative G has the same stall producing characteristics as positive G. *Remember in any case the airplane is stalled, whether inverted or erect, only if it is at or beyond the corresponding angle-of-attack for stall.* The erect stall Alpha is marked on the indicator in many airplanes (see Fig. 3) but the inverted stall Alpha may have to be *guesstimated*.

Here are some general prudential rules to aid the pilot in re-orienting and to assist him in taking proper corrective recovery action. He should always be alert to the nature of the surface below him and the sky around him. Color differences, clouds and cloud formations are of value. In general, power should be reduced to avoid engine and propeller damage or compressor stalls in jets. The controls should immediately be neutralized and *held* in that position until the pilot can get oriented as to what is happening to the airplane. Frequently the airplane

CDR Merlin L. Johnson, USN is presently assigned to Commander NATC Staff as a program manager. He is a graduate of the U. S. Naval Test Pilot School, Class 11, and a member of the Society of Experimental Test Pilots. He has flown over 90 different models of airplanes and conducted over 1500 spins in a variety of airplanes from SNJ trainers to operational jets. He instructed in spin testing procedures and techniques at the U. S. Naval Test Pilot School for three years.

Fig. 3
Erect stall Alpha is marked on the indicator in many airplanes.

will recover unassisted, if the controls are *held* in this position.

As previously stated some pilots *wipe out* the cockpit with spastic control inputs, seeking an instantaneous recovery when the airplane goes out of control. Pilot inputs of this nature only tend to add to the confusion and prevent the controls from being effective for recovery. If disoriented, check the instruments and *believe them.* If a spin has developed use the *turn needle* to determine the direction and initiate proper spin recovery. Recovery controls must be held in long enough to become effective.

Do not use the ball of the needle ball indicator as a guide for applying the rudder opposite to the spin direction. The phrase step-on-the-ball has directly contributed to several known spin accidents. The ball can be in any position if there are unusual variations in side forces—and there usually are. The *turn needle* is the only consistently correct spin direction reference instrument.

Use the other flight instruments to assist in determining what is happening to the airplane. In addition, some aircraft have particular secrets to let you know if you are inverted, besides the sometimes obvious indications of hanging in the seat straps or seeing bilge debris floating around in the cockpit. For example, in the T-1A and TF-9J the radios go dead if inverted flight is held longer than a few seconds.

In summary, spins in high performance airplanes should be avoided and intentional spins, although excellent confidence building maneuvers, should be conducted only under controlled and monitored conditions in airplanes authorized for this flight realm. Flight maneuvers which encroach upon the edge of the stall/spin regime must be utilized if maximum maneuvering performance is to be realized. Therefore be intimately familiar with the stall and spin recovery techniques for your airplane and apply them should a lapse of skill or judgment get you into an out-of-control situation. Use your instruments, believe them and above all, *don't panic and you can win!*

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Would you believe...?

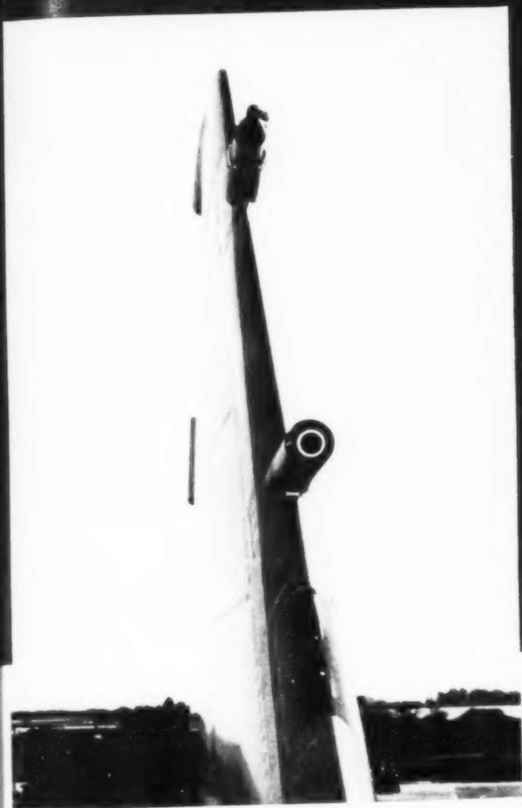
The pilot and RIO of an F-4B commenced a routine training flight out of sunny Key West.

The RIO, performing his post-takeoff duties, noted with some interest that the rain seal on his canopy was vibrating markedly and appeared to be loosening. With fascination the RIO watched the rain seal finally vibrate loose, pull out of the canopy and immediately disappear from view in the windstream.

This brief episode over, the RIO's attention was now drawn to the fact that the airspeed indicator was displaying a near ZERO reading.

The pilot immediately returned to home plate where an uneventful landing was effected. Upon returning to the line, the culprit causing the ZERO airspeed indication was found to be the missing canopy rain seal, now firmly lodged in the pitot tube on the vertical fin. (See photos.)

Editor's note: Shades of the old P-2V isn't it? The heater intake on the vertical fin of the venerable Neptune often trapped an odd collection of the navigator's paper products, old ETAs, paper clips, box lunch goodies, etc., but who would suspect the Phantom II, too? by Lt Hal Seaman, ASO, VF-101



Rail seal lodged in Phantom's Pitot tube

By COL J.H. Reinburg, USMCR

The average layman does not look upon fog as bad weather. To him, thunderstorms and heavy rains are his nemesis. The reverse is generally true to the military aviator. He is equipped to safely transgress through rain and clouds as long as the stuffing is known to be several thousand feet below. Unfortunately, both pilots and airplanes must return to earth for replenishment at precise times. This is where the stuffing solidifies and fog becomes a sinister and untasty frosting.

Fog, in some ways seems to be a simple thing because in the daytime, one can often see the sun straight up through it. So why should such a thin layer of fog cause trouble? It is this reduced horizontal visibility blanket that makes guesswork at airport locations.

To the aerologist fog is clouds close to the ground, but to the aviator it is a hider of airports. NATOPS titles it a Hazard to Flight in the following quoted excerpts:

". . . Fog is a restriction to visibility caused by moisture condensing in the atmosphere and forming a cloud at the surface of the earth. Fog is reported when the horizontal visibility at an air terminal is reduced to less than 5/8 mile (1 kilometer). Fog is formed when the atmosphere is saturated by the air being cooled to the dewpoint temperature or the addition of sufficient moisture to raise the dewpoint to the temperature of the atmosphere. Radiation and advection fogs are examples of the former; frontal, steam, and arctic-ice fogs are examples of the latter means of saturating the air. Being formed by different conditions, the various types of fog are characteristically found in particular areas of the world. The pilot should be aware of the natural processes working in his area which could result in fog formation and dissipation.

Although fog often forms very quickly and can cover large areas, its formation is *seldom without warning*. The pilot must be alert for the indicators *which foretell the formation of fog*. He must also recognize the more vexing and dangerous situation when fog has not formed, though conditions are favorable, and the distinct possibility of its imminent formation. This situation is precarious because the tendency may be to ignore the potential hazard that ceiling and visibility could very quickly go from that which is completely adequate for normal operations to zero-zero. The general indicators for the pilot to carefully watch for fog formation are *dewpoint spread and wind direction and speed.*

Theoretically, the relative humidity should be 100 percent for the formation of fog, but in actuality it is normally something less due to impurities in the atmosphere that absorb moisture at humidities less than saturation. Visibility will start to deteriorate at temperature dewpoint spreads of *from 5° to 8°F.* In industrial areas, fog can form at even greater temperature dewpoint spreads due to large amounts of the products of combustion in the air, which

GAMBLING with

At precise times...

have a strong affinity for moisture. In this case the visibility reduction is actually due to a combination of smoke and fog and is called "smog," a familiar term in many large cities. . "

A recent F-4B accident is a perfect example of fog gambling. This flight blasted off for an IFR Round Robin just before sundown in a light drizzle which was a prelude to imminent fog. Aerology reported the takeoff base weather to be 700 ft broken 1500 ft overcast and visibility 6 miles. The forecast upon estimated time of return (1 hour and 40 minutes later) was 400 ft broken, 800 ft overcast, 3 miles visibility in a mixture of rain and fog. The alternate airport was reporting 400 ft overcast, 4 miles visibility in a mixture of light rain and fog. The whole area was under the same general weather grip. The temperature/dewpoint spread had been steadily aproaching the same number and was a meager one at time of takeoff. Deteriorating weather was obvious.

It was a no-sweat-takeoff and hardly before the wheels were fully retracted, the *Phantom II* was VFR on top. The flight went according to plan and the pilot made a GCA to a field along the route. This required a fog-cutting swath near the ground followed by the scheduled waveoff in accordance with the missed approach procedures. It was labeled a successful practice approach.

The crew, no doubt, relaxed somewhat because the next GCA would be to a full stop at the home base. Thoughts of a cool beer as a reward for gaining some valuable IFR experience is a reasonable supposition. Successful contact with the home base Radar Air Traffic Control Center (RATCC) just before planned letdown time created another notch in the descent ladder—home—safely—once again.

Radar Air Traffic Control Center shattered the relaxing trend by informing the pilot, as predicted, of worse weather than when he had departed: "Sky partially obscured, measured ceiling 300 overcast,

the FOG

visibility three quarters, very light drizzle and fog, over." Soon thereafter the crew was further shaken by being told that a pilot who had just landed reported a ceiling of 200 ft. A new visibility report reduced horizontal sighting to one-half mile. Unknown to the pilot, fortunately, his squadron cancelled further flights because the temperature/dewpoint spread had reached zero. If figures mean anything, this atmospheric saturation indicates total fog and almost zero visibility.

Here was a perfect example in which localized weather messed up the whole works. The quote "Sky partially obscured—" indicated generally VFR weather on top. This kind of weather does not tax the brain, once in the air. The catch was, if low on fuel, finding the field would not be easy. The planes are in the same situation as cars trying to stay on the highway and not collide with each other. It is downright precarious and dangerous to find that "little" runway somewhere down there.

The drama is developing because our airborne friends are in a trap. Since all airports they can reach are below NATOPS minimums, it is either risk a violation and/or crash or eject.

An F-4B moves fast and fuel disappears rapidly (150 IAS—about 125 pounds/min) at the lower levels of GCA operations. Our airborne friends must make the decision quickly.

At this time, it is appropriate to reveal that the pilot had only 362 total hours and 26 hours in this multimillion dollar F-4B. Many of us old but not so bold pilots feel for the crew at this moment. Ejection, as viewed from this LMD (large mahogany desk), seems to be a good selection when one considers the situation in retrospect. But ejection does not necessarily mean survival in the swamps of the known territory below our actors.

Now might be the time to revive an old and obsolete adage. 'When in trouble or in doubt, fly in circles, yell and shout—then bail out."

Enough of quarterbacking!

The F-4B pilot requested radar approach control to set him up for GCA. Anxiety now seemed to be deteriorating the pilot's maximum ability because there was some confusion in following subsequent letdown directions. Moreover, hurried requests were made for the weather at the alternate and other nearby military airfields. Such a multitude of thoughts are bound to impede an orderly letdown and associated directions. Intermingled with this, the squadron operations officer had Approach Control (APC) ask the pilot his fuel state. Such a request is perfectly

in order but contributes nothing to the pilot's efficiency, while possibly distracting him from a more precise letdown.

Upon informing APC of his fuel state, the pilot revealed recognizable concern by his own brand of slang as he asked, "When you give us this GCA would you advise them to get us in ASAP so if we have to think of someplace else, we will have as much as we got." The APC did not fully understand this dialect and added to the confusion by asking for a repeat.

Next in order, the pilot was told by the APC that he had 12 miles to get from 13,500 to 3000 ft. The descent requirement should not have been difficult at 4000 ft/min, but the pilot did not succeed in reaching the assigned lower altitude in the allotted distance when the Feeder Control (FDR) took over from the APC. Right away, the new man directed him to continue the descent to 1200 feet. This was barely confirmed when the new controller informed the pilot of the field minimums, repeated the local weather and confirmed that the visibility had dropped to half a mile. At this time, the pilot was still descending (passing 5000 ft) and he was being circled to arrive at the assigned altitude. During the circle, there was conversation about the weather at other possible alternate airports. In the middle of this, the assigned altitude was assumed to be reached and the pilot was given the message: "Roger, perform landing check and reduce to approach speed." This was quickly followed by the first approach heading. Immediately thereafter, the weather at the alternate was again given to the pilot. This repeated broadcasting of other airports weather does not seem to be in order at this particular time considering that the pilot had not yet settled on the specified altitude and the course heading. Experience has shown that jets are difficult to stabilize on the initial course at a precise low altitude when coming out of a steep and high speed descent. It is quite easy to undershoot a specified altitude and 1200 ft is not much margin of safety. In spite of another not-too-necessary weather report of another base, the pilot seems to have settled onto the assigned course and altitude as he was passed on to the Final Controller (FC).

The FC's first transmission is slightly confusing: ". . . your final controller, continue the right turn heading three one zero, if you should fail correction acknowledge wheels down, over." The pilot made his last transmission: "Roger, gear down" and for the next two minutes seemed to follow continuous FC conversation fairly well.

Things happened fast as the last part of the FC's chatter is quoted: ". . . nice rate of descent, you're on glide path, you're on course, mile and a half from touchdown, turn left three two five, on the glide path, turn left three two three, on glide path, rising above now, slightly above glide path, turn left three two zero, the on course very slightly left, continue left three one eight, pick up rapid drift, you're going below, you are below the glide path, if runway not in sight, climb immediately straight ahead. Acknowledge, over."

No more transmissions were heard from the pilot and it was quickly and correctly surmised that the plane crashed short of the runway.

In his statement afterwards (yes, both crewmen survived—but not that costly F-4B—some kinda luck—huh?) the pilot said he experienced slight vertigo just before settling down to the FC's directions and then he quickly felt all was under control.

Now here is a point of possible confusion which was meant to be helpful. Two people were talking to the pilot at the same time, the FC and the RIO. It is a very quickwitted man who can listen to two people at once and follow the directions of either correctly.

All the time that the FC was talking to the pilot to bring him in on the final approach, the RIO was interjecting his voice with altitude information to the pilot as per mutual understanding. The requirement for precision on GCA final is a workout for even the most experienced pilots (which this pilot was not). Moreover, the F-4B's relatively high speed of approach left little time for error.

Looking back on the last part of the transmission, the FC just had time to tell the pilot twice that he was below glide path when only a moment before the message was "slightly above glide path." It is not inconceivable that the RIO's conversation could have drowned out the only two very critical notices of being below the glide path.

In summary, this accident, has no one single glaring error. The accident board assigned most of the blame to pilot error. The reviewing senior command overruled this, blaming most of it on lack of supervision by the senior squadron officers.

Obviously, the first and most glaring mistake was launching the flight when the weather trend was bad for the entire area. A falling of temperature/dewpoint spread is almost a sure warning of impending fog. Several factors not brought out by the investigators are: (1) It was not a smooth descent and entry into the final approach; (2) possible interference of the RIO's voice with that of the FC; and (3) a need for greater respect for fog trends until better cutting tools are available.

Reader Questions • Headmouse Answers

Have you a question? Send it to Headmouse, U. S. Naval Aviation Safety Center, Norfolk, Virginia 23511. He'll do his best to get you and other readers the answer.

Shoes

Dear Headmouse:

Considering that funds (lack of) are what they are today, our maintenance officer has become very interested in the possibility of substituting the plain black steel toe safety shoe (Mil-S-41821) for the brown steel toe flying boot (Mil-B-21408). All his maintenance personnel, including aircrewmen, have the black safety shoes at $6.90 per pair. The brown flying shoes cost considerably more at $11.40 a pair.

My own personal research didn't enlighten us as to any inadequacies in his reasoning. Both shoes have the steel safety toe and are high top lace type. The safety shoe has non-marking, non-sparking, oil-resistant neoprene and cork heel/sole while the flying boot has a grid type rubber sole and heel. I can't see where this should affect either, as far as safety is concerned, unless the flying shoe provides impact resistance and the black safety shoe does not.

Your comments are sought and will be kindly appreciated.

LCDR F. M. BURLESON
ASO, NAVSTA, ARGENTIA

▶ The black steel toe safety shoe (Mil-S-41821) is neither a flight safety boot or a field shoe. While suitable for maintenance work, under current regulations it is not authorized for use in flight.

At the present writing, NATOPS (*OpNavInst 3710.7C*, Chapter VIII) says that all crewmembers and passengers in combatant aircraft and single-engine training aircraft shall wear flight safety boots/field shoes (ankle high lace type). Wearing such shoes is "encouraged" in all other Navy aircraft.

According to the *Section H Allowance List (NavWeps 00-35QH-2)*, the steel toe flying boot (Mil-B-21408) is to be issued to all pilot and nonpilot crewmembers of ejection seat aircraft. For other assigned aircraft, the N-1 field shoe is to be issued until stock is exhausted. Thereafter the flying boot is authorized for issue.

So much for current regulations. The Naval Air Systems Command informs us that the Navy is procuring the Army combat boot to be used as a flying boot for personnel in non-ejection seat/non-carrier based aircraft. The boot is said to have excellent retention qualities (a very good feature in case of bailout) and also good ankle support (very desirable on parachute landing). The boot costs $6.40. This procurement is reflected in the June 1966 *Section H Allowance List*.

Very resp'y,

Headmouse

Close the A-6A Canopy Manually

Dear Headmouse:

When the engines are not turning and the hydraulic system is not pressurized the A-6's canopy must be closed or opened by manually pumping hydraulic pressure.

This is a laborious process and during rainy weather almost guarantees a rain-soaked cockpit before the canopy can be pumped closed. One pilot tried shutting down the engines while outside the cockpit, tripping the electrical switch closed to allow pressure generated by the windmilling engines to hydraulically close the canopy. He was trapped by the closing canopy.

In another case, the pilot turned over the aircraft to an inexperienced plane captain with the engine still running. The plane captain tried the same procedure but managed to shut down only one engine. With electrical power ON and hydraulic system pressurized, the canopy closed but now it was impossible to open the canopy manually. Without the help of the line chief, the *Intruder* might still be sitting there burning up a full fuel load at idle.

While the obvious solution to this situation is: Don't leave the aircraft until your responsibility is fulfilled—the use of nonstandard procedures are dangerous at best—operators should be warned.

BATMOUSE

▶ Looks like the best bet now is to close the canopy manually. Interim Change 6 for the A-6A and Change No. 1 to the EA-6 NATOPS Flight Manual state: "Man-

ual canopy selector handle actuation will control the canopy position during engine operation with electrical power OFF. *Warning*: Actuating the manual control selector handle after engine shutdown will close the canopy if engines are still windmilling. Serious injury can result from premature closing of the canopy prior to crewman being cleared of the cockpit area."

Canopy actuation, open or closed with power ON takes only 5 sec. In a windmilling situation, the canopy closes in 7-10 sec. Dangerous, you bet!

An Engineering Change Proposal has also been developed which will provide a battery operated auxiliary hydraulic pump which will permit electrical canopy operations externally. Until your aircraft has this device incorporated, pump that canopy shut manually—Don't risk your well-being for a wet cockpit.

Very resp'y,

Headmouse

Grease for Glare

Dear Headmouse:

In your September 1966 issue I read the letter from CDR W. Spangenberg of VF-143 about the helmet dual visor kit. I appreciate CDR Spangenberg's problem as I too react from the sun glare.

I have experimented on several flights with a clear visor and have used eye-black (the black grease under your eyes, used usually in football games), and found it cut glare down and withstood the normal amount of perspiration on a three-hour hop. It would also be of multiple use in a survival situation. It is easily applied and does not appear to be of any danger. It might be an immediate answer until the dual visor kits arrive.

LT T. K. WOODKA
CARAEWRON TWELVE VAW-12

As you point out, the use of eye-black will reduce glare from bright light. However, as our reviewing flight surgeon reminds us, there is potential danger in using any flammable material such as grease or other petroleum products near oxygen. Volatile materials evaporate more readily at higher altitude, thereby increasing any hazard which might exist from fumes. In the absence of a properly evaluated aviation eye-black material, it will probably be safer for aviation personnel not to experiment but to wait until the dual visor becomes available.

Very resp'y,

Headmouse

Unlike the flight control systems on present day high performance aircraft—the Naval Aviation Safety Center desires a continued feedback.

Has information in any Safety Center publication ever helped you to prevent an accident, avert an injury, or deal with an emergency in a better way?

If so, and you have not already informed the Safety Center, it is particularly desired and important that you do so. Such feedback is vital to all departments at the Center and for fiscal support of our safety research and education program.

Survival Equipment

Dear Headmouse:

I would like to find out about how often you should check air droppable SAR gear. It consists of a multiplace life raft, Gibson Girl radio and our own version of an air droppable rescue kit. We have one set up for a SP-2H hook-up and a HU-16D hook-up. This gear normally stays in a covered trailer in the hangar for ready use. What my problem consists of is how often should this gear be checked? At present, I am operating under the understanding that it is left up to the command. I have been checking it every six months. Do we check it just like normal gear or is there some other specified time for checking it?

Also, I would like to know what bulletin gives the authority to take out the set screws in the actuator on the Mk-2 life vest. I have heard that there is a bulletin on this but cannot find it.

PR3 JOHN W. RIEB
PARACHUTE LOFT
USNS ROOSEVELT ROADS

When you have an air droppable rescue kit such as you describe in your letter, you check the gear according to the different instructions applicable to the separate items. We know of no single instruction which would cover this question.

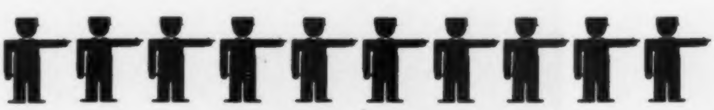
On your second question, Naval Air Systems Command Headquarters message 181528Z of December, 1965 (Interim Clothing and Survival Equipment Bulletin 8) states: "Note: Do not reinstall set screws. Removal of set screws will permit rapid removal of CO_2 cylinders and deflation of life vest in the event of accidental in-flight inflation of vest."

Very resp'y,

Headmouse

Each copy of APPROACH is meant for ten readers.

PASS IT ALONG!



CANDID CAMERA


1


2

F-8 in trouble—low fuel state. Possible nose gear difficulties required 3 passes for visual landing gear checks; 2 foul deck waveoffs and a hook-skip bolter followed. Now, it's a must-trap situation. . .

1. Rig the barricade!
2. Clear the decks
3. Deck cleared—barricade rigged!
4. In the groove . .
5. Trapped on touchdown—note No. 2 wire engagement
6. Delta damage, but here for mission on another day!

A trained deck crew ready for any eventuality can turn a bad situation into a good show! Please read "Line Safety" beginning on page 36 for tips on how a squadron can help in times like these.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6

Super–Vision

By LCDR R.L. Rundle, ASO, VR-30, NAS Alameda

A key word in aviation safety is *supervision*. A lack of it can lead to a chaotic existence, lower morale and even create hazards in itself. The right amount of supervision leads to a safe, orderly way of life that we all yearn for.

What is this nebulous term that is so difficult to define quantitatively and yet is accepted and actually assumes responsibility for nearly all accidents? A word that we refer to as being necessary to perform nearly every task properly.

Webster's definition of *super* is above and *vision, from the Latin visio, is to see.* Supervision then means over above or superior to, greater in quantity or seeing something by other than normal sight. The ability to perceive something that is not actually visible.

Why don't we supervise? Is it because we lack the necessary manpower? Is it lack of motivation? Laziness? Is it unprofitable to be a supervisor? Are there other factors that cause us to deviate from our supervisory capacity? Is the term so indistinct and unclear that we are not really sure what a supervisor is or does? Is there a natural tendency for almost everyone to abhor being supervised? Why is every officer graded on his supervisory capacity and every man on his leadership qualities? Are we concerned only with the end results and not the details in between?

In previous years it was believed that if you could "work them like hell, feed them good, and pay them on time", the rest would take care of itself.

Our accident and incident rate proves this is not completely true. The average age of all naval personnel is 22 years. Only a small percentage have completed college and only a slight few have the technical knowledge required to maintain and operate our multimillion dollar equipment (The technological advances have been greater in the last 20 years than in the previous 100. We alleviate this situation in the Navy by one of the finest school systems possible. However, at this point internal pressure is lost in the system and there is a lapse into the well known on-the-job-training program. This includes part time or no supervision, get the job doneitis, "attaboy" and "keep up the good work" type complimentary expressions. We accept human error with the fervent hope that it won't happen again, throw in a couple of "Murphys" and write it up as lack of supervision.

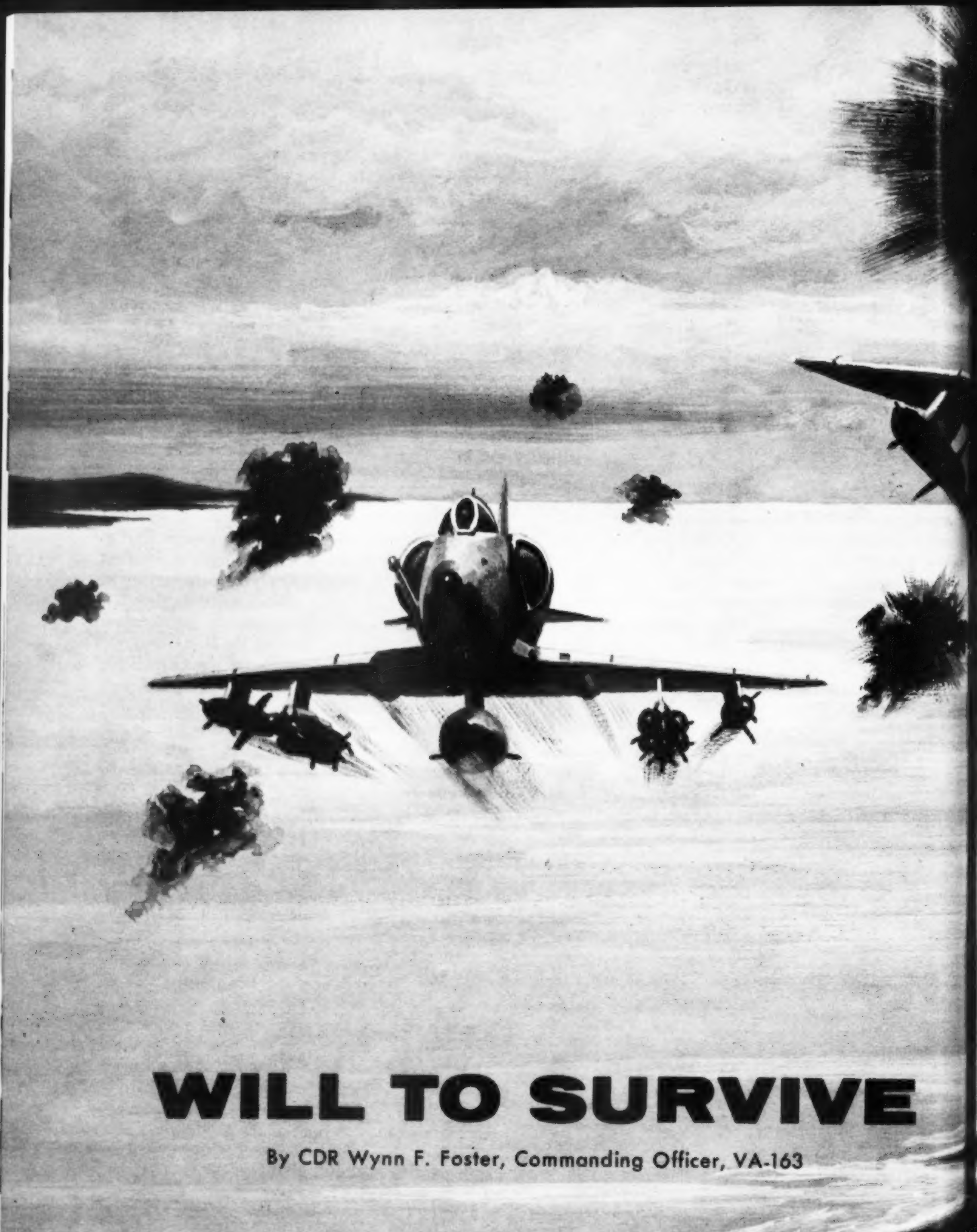
Supervision is something more than just watching and observing. It means attention to detail, training, management, guidance, control and direction. It means that every officer and petty officer is a supervisor. It means responsibility, reliability, and change. It means reading up, study, self-discipline, mobility, deep thought and concentration. It means a special devotion to your duty, responsiveness, planning and finally new concepts. Supervision is akin to extra sensory perception, knowing what to expect and planning for it.

A 30 percent manpower turnover every year aboard your ship or squadron means a never ending absolutely continuous supervision of every man from the skipper on down. Supervision from compartment cleaning to ordnance is an absolute necessity. Proper full time supervision *does* prevent accidents. Supervision is a deliberate plan to insure that the job is completed safely and correctly. It *does* save time and material. Records show that our accident rate has been lowered substantially but incidents continue at approximately the same rate. Reading the incident reports is dreary proof that supervision is lacking in many areas.

To quote from a study completed by Admiral Arleigh Burke titled *Discipline in the U. S. Navy*:

"There is much comment that the younger officers and the petty officers are inexperienced and lack ability in the divisional duties. This is true. But they will get that experience only under the direction of their seniors, and we are back at the starting point again—that the seniors don't have time to exercise proper supervision. Seniors could well devote more effort to delineating to juniors, especially the JOs exactly what is required of them. Too often these enthusiastic young men are simply told to comply with the mass of directives from the multiple higher authorities without adequate guidance or counsel. The lads end up confused, frustrated, overworked and disheartened. From that position it is a gentle down hill slide to lack of pride and loss of ambition. The situation is gradually improving but it will not improve at a high enough rate until more emphasis is placed on the handling of men and less on the volume of paper scanned."

Observation, since Admiral Burke's study was completed *over 10 years ago*, indicates no great improvement has been made. In this day of tight money consider the high interest rate we are paying for lack of supervision. There is no way to amortise this shortage. It must be paid in full. Are you supervising? Do you have supervision?



WILL TO SURVIVE

By CDR Wynn F. Foster, Commanding Officer, VA-163

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(With his will to survive, plain gut courage and coolness in a combat ejection survival situation, the pilot whose narrative we present here typifies the caliber and training of the Navy fliers performing some of the toughest missions in Vietnam. Here is his story in his own words.—Editor)

As commanding officer of an attack squadron, I led a routine mission against a suspected target in North Vietnam. My wingman and I launched about 0750 and rendezvoused overhead of the carrier. We departed on top at 0810 and headed for our planned coast-in point. We began our descent from altitude.

"Shortly after the coast-in point, we began picking up flak bursts to our starboard side, just north of our track. I called the flak to my wingman's attention and told him to keep jinking. A few seconds later I heard a loud 'bang' followed by a 'whoosh' and I felt a stinging sensation in my right elbow. I realized I had been hit and looked down at my right arm. The arm was missing from the elbow down and half of my right forearm was lying on the starboard console.

"During the first few seconds I had a hard time convincing myself that most of my right arm was missing, but when I tried to move the stick, I was convinced. I took the stick with my left hand and started to head the aircraft back out to sea. I radioed my wingman that I had been hit, then broadcast 'Mayday,' giving my side number and general position. I told my wingman to keep jinking and to get clear of the area. My airspeed was dropping so I eased the nose down and tried to hold about 220 kts. The shell frag (I estimate it was at least a

57mm because of my altitude at the time I was hit) had blown out most of the canopy and it was very noisy in the cockpit. The cockpit was quite a mess with flesh and blood splattered over the windscreen and instrument panel. I made a couple of radio transmissions to my wingman to see if he was OK but the wind noise was such that all I could hear was garble. Shortly thereafter I looked in my mirror and saw my wingman was still with me.

"My arm didn't hurt but I was bleeding quite badly. I momentarily considered trying to make it back to the ship but realized I would probably pass out before I got there. The nearest 'friendly' was the SAR DD stationed about 30 miles to seaward of the coast-in point. I thought I had been hit in the engine as well as the cockpit since I was still descending while holding 220 kts. I thrashed around the cockpit, making radio transmissions, flying the bird, changing tacan channels, and trying to arrest the bleeding by squeezing my right upper arm.

"About the time I descended through 2500 ft, I looked at my RPM and realized I had only 70% power. Things had been pretty confusing, and it was the first time I had looked at the RPM since getting hit. I advanced the throttle and the RPM began to build up. The engine seemed to be working properly, and I climbed back to 4000 ft. I heard a garbled radio transmission and recognized the words 'your posit.' I replied that I was 240/15 from the SAR DD, that I had been hit in the cockpit, that I was bleeding badly and intended to eject as close to the SAR DD as possible. I then called my wingman and told him to tell the SAR DD that I would need medical attention immediately.

"There were several subsequent radio transmissions by other stations, but they were all too garbled for me to understand. I was beginning to feel weak and decided I'd have to eject and get my flotation gear inflated before I passed out. As I neared the SAR DD, there was a broken undercast. For some reason I decided I wanted to see the SAR DD before I ejected.

"The undercast wasn't very thick and I descended through it, leveling about 3000 ft. As I broke out, I saw the SAR DD below, churning white water and heading directly for me. I glanced at the DME, which read three miles. Since I was feeling quite woozy, and beginning to experience tunnel vision, I decided to eject. I made sure my heels were on the deck, sat up straight, and pulled the curtain with my left hand. The next thing I knew I was tumbling or spinning. I heard a sequence of several snaps and pops, then felt the bladders toss me out of the seat. Shortly thereafter the chute opened and I seemingly was suspended in midair.

"My oxygen mask was still on, and my visor was down. I removed the oxygen mask and dropped it. I looked around. The view was beautiful—blue ocean, white clouds above, and the DD steaming down below. The war seemed a million miles away.

"I was feeling pretty woozy and couldn't concentrate on any one thing for very long. I held tight on the stump for a few seconds and then remembered to inflate my C-3 life vest. I inflated the left side first, then couldn't find the right toggle with my left hand. I groped around for a few seconds, then forgot about the right toggle.

"I unfastened the left rocket jet fitting and let the seat pack fall to the right. Actually, it seemed to hang between my legs. I attempted to get at the lanyard to the life raft but with my left hand, all I could reach was the D-ring for the bailout bottle so I forgot about that too. I went back to squeezing my stump and noticed I was still wearing my left glove. I pulled off the glove with my teeth, let it drop, and went back to squeezing the stump. I watched the glove falling lazily a few feet away from me for a while, then shifted my gaze to the DD. I didn't have any vertical reference points, and for a while it seemed I was not falling. I noticed the DD had a boat rigged out and suspended a few feet above the water.

"I couldn't think of anything else to do so I just kept applying pressure to the stump and watched my wingman flying in a tight circle around my position. I recognized relative movement when I was just a few feet above the water. I crossed my legs, held my breath, and almost immediately hit the water.

"When I bobbed back to the surface, I floated for a few seconds before I remembered to disconnect myself from the chute. The water was warm, with a gentle swell, and there was no discernible wind. The chute had collapsed behind me and all I could see were some shroud lines over my shoulder. I unlocked both Koch fittings and the risers fell away behind me.

"The SAR DD was about a half mile away and the whaleboat was already in the water. I saw someone in khaki point in my direction. I muttered a few encouraging curses to speed them on.

"I had lost the sense of time passage but it seemed that the whaleboat got to my vicinity quite rapidly. As the whaleboat neared me the coxswain throttled back and turned away. Apparently he was concerned about running over me. I yelled to the boat that I was bleeding badly, and to drive right in, which the coxswain did.

"When the boat was alongside, numerous hands reached out to grab me. I told them to be careful of my right side. After I was resting safely in the

whaleboat, my right arm became painful for the first time. Up to that point, I had had just a mild stinging sensation. Someone removed my helmet and cradled my head in his lap. There was a corpsman in the boat and, although I didn't feel him puncture my arm, I was receiving Dextran from a bottle within seconds.

"The pain was severe, so I asked the sailor holding my head to break out the morphine syrettes I carried in my left sleeve pocket. He said he had never given morphine so I mumbled step by step instructions. I told him to unscrew the plastic cap and throw it away, push the wire plunger all the way into the syrette, then pull it out and throw it away. The sailor was obviously shook because he pulled out the plunger and threw the syrette over the side. We went through the whole thing again with the second syrette, this time successfully, and the sailor got the morphine into my arm. I thought I was going to pass out so I told the sailor to remember to tell the doctor that I had been given morphine.

"Shortly thereafter, we came alongside the SAR DD. The bow and stern hooks were sharp, we latched on smoothly, and almost in one motion, were hoisted to deck level. I was taken down to sick bay where the ship's doctor began working on me. After a few minutes, another doctor from another carrier arrived and introduced himself. In my drowsy state that confused me somewhat. After pondering the thought, I announced that my carrier was closer than his and that I wanted to be returned to *my* ship.

"I have no idea how long I was aboard the DD, but recall someone saying 'about an hour ago,' apparently in reference to my accident. That would have made the time about 0930. Shortly thereafter, I was placed in a stretcher, taken on deck and hoisted into a helicopter. Just before I left the DD sick bay, I insisted that my flight boots go along with me. A couple of my officers had dyed the boots bright blue . . . the squadron color . . . a few days previously as a joke. This was the first mission I'd flown wearing my blue boots and I didn't want to lose them. The carrier surgeon assured me that all my gear would accompany me.

"I don't recall how long the helo trip back to my carrier took. I was pretty well doped up on morphine and quite weak. When we set down on the flight deck I recall two things distinctly: the air boss announced on the 5MC '163 returning,' which made me feel better and our flight surgeon spoke to me. Hearing a familiar voice also made me feel better. His comment was, 'Boy! Some people will do anything to get out of a little combat!' With friends like that, who needs enemies? I was taken below and into surgery, where among other valiant efforts (eight units of blood) what was left of my right arm was surgically amputated, leaving me with about a six-inch stump.

"In retrospect, I can think of some survival procedures I could have followed to more closely coincide with 'the book.' But it is encouraging to note that the essential things worked. The A-4 Rapec seat, which is famous for its simplicity and reliability, worked as advertised. My wingman stated that, in addition to the frag that went through the cockpit, my aircraft was 'full of holes' and streaming fuel from several places. It is logical to assume that frags could have penetrated the fuselage and damaged the seat mechanism, since my wingman stated the AAA burst was 'close aboard' my aircraft. However, it never crossed my mind that the seat would function other than as advertised when the time came to use it.

"One half of the C-3 life vest is sufficient to keep afloat a pilot with full combat gear (.38 revolver, ammo, survival vest, RT-10 radio, etc.). The Koch fittings worked correctly after water entry. I merely unlocked them and the riser straps fell away. My .38 revolver and pencil flares, carried in a front pocket of my survival vest, were readily accessible although in the circumstances of my rescue they were not used.

"I retained my helmet with visor down throughout the incident until I was in the whaleboat. With the visor down, oxygen mask on, and chin strap cinched, I experienced no facial injuries or discomfort from wind blast, even though the canopy and part of the windscreen had been carried away by the frag. I experienced no difficulties in doing essential things with only one arm, except for access to my morphine syrettes. I carried them in the left sleeve pocket of my flight suit and could not get at them. I recommend that morphine syrettes be carried in a more accessible one-handed location, possibly in a front pocket of the survival vest.

"I could not reach the life raft lanyard with my left hand after releasing the left rocket jet fitting and letting the seat pack fall to my right side. During my flight from the beach to the SAR DD, I thought of applying a tourniquet to my right arm stump. I had the nylon cord lanyard attached to my .38 revolver handy, but reasoned that the effort to untie it, get it around the stump, and secured (with one hand and my teeth, no doubt), coupled with flying the aircraft was a tenuous prospect at best. Some thought might be given to a simple, one-hand operable tourniquet as an addition to combat survival gear. Not everyone will have his arm blown off, but there have been several pilot injuries in the Vietnam war where such a tourniquet would have been handy."

Let There Be Light

Due to increased sink rate, an RA-5C was arrested nose high on the eighth approach during night carquals. The aircraft pitched sharply down, the nose strut shattered and a flash fire occurred. At this time the Radar Airborne Navigator (RAN) initiated his ejection. The pilot stayed with the plane and, uninjured, left the cockpit with the assistance of the crash crew.

At the instant of the flash fire, the RAN's immediate impression was that ejection had been initiated by the pilot and he instinctively pulled his face curtain.

"I saw a blinding flash and I pulled the curtain," he recalls. "My first thought was that the pilot had ejected us and my reaction was strictly mechanical."

Ejection was gentle and smooth, as he went from the brightness of the flash to "quiet blackness." He does not recall any buffeting or tumbling or the opening of the chute. He entered the water feet first without any sensation of impact.

Sea state was calm, wind 5 kts. Without difficulty he removed his gloves, released the parachute risers by actuation of the rocket jet fittings, and then released the D-ring. He was not dragged.

At this point he inflated his Mk-3C life preserver and inflated his raft. He attached the raft to the lanyard on the life preserver, discarded the top half of the seat pan by releasing the lower rocket jet fittings and entered the raft.* During these maneuvers the oxygen mask felt loose on his face and he removed it. He cannot recall oxygen being delivered through the mask but states that he did not get sea water in his nose or mouth at any time before removing the mask. He feels that he was under water without respiratory difficulty for a time after impact and while removing his gloves.

After getting into the raft, he fired two tracers. A helo approached with searchlights on. He could see the rescue seat but as he got out of the raft and headed for it the helo searchlights were turned off.**

*Apparently the lanyard on the life preserver was a local modification.

**The helo crew turned the lights off because they thought they were blinding the survivor.

Left in darkness, he boarded the raft again as the helo circled away. He fired a third tracer and then ignited a night flare but failed to turn on his strobe light.

The helo made a second approach. Once more the RAN left the raft and headed for the rescue seat which was suspended just above the surface of the water. He put his helmet visor down for protection against the rotor wash. Thinking that once he had contacted the seat it would be lowered so that he could climb on, he grasped the center cylinder with his elbows resting on the seat prongs. Instead, he was suddenly hoisted out of the water to an unknown height.

Having recovered from his surprise, he considered dropping back into the water but decided against this as he could not judge how high he was. With considerable difficulty he managed to hold on, despite the additional drag caused by the raft and sea anchor which he now realized were still attached to the lanyard of the Mk-3C. (The top half of the seat pan must also have been hanging from the raft since the RAN did not disconnect it.) At the end of the cable travel, he was only head and shoulders above the floor of the helo at the hatch and could not even touch the helo with his legs. The two crewmen dragged him aboard, cutting the raft lanyard away in the process.

Return to the flight deck was uneventful. The RAN was uninjured except for flash burns of the forehead, received in the ejection, which did not require hospitalization. His gloves protected his hands from flash burns.

"The RAN was adept in the use of his equipment," the AAR states. "This is indicated by his survival actions which commenced immediately upon his response to the flight deck accident. The ejection response was decisive and immediate. Evidence indicates that the ejection took place well outside the normal seat envelope of 100 KIAS minimum, straight and level. . . . The deliberate manner of his actions indicated a high degree of composure. He attributed this to the detailed training received, noting particularly the acclimatization received as a result of live suspension in the RA-5C parachute harness with all equipment attached, in the squadron paraloft."

Of the RAN's failure to turn on his strobe light, the accident board states, "When a reasonable probability of sighting exists, all 'protracted life' signalling devices (lights, whistle, mirror, etc.) should be used continuously, combat situations excepted. 'Highly expendable' signaling devices should also be used, but with prudence, considering the probability of sighting against the eventuality of exhausting the supply (tracers, flares, smoke lights, etc.)."

The rescue helo crew stated they could not see any reflective tape on the survivor's helmet.

"It is noted that the survivor stayed inside of or in close proximity to his raft during the entire rescue operation," the AAR states, "as it remained attached to him via the raft lanyard (7 ft long) until pickup. Apparently the crew could not see the raft either, attesting to two facts: 1) the night was dark and 2) the helo crew suffered reduced night vision adaptation after the temporary use of the helo landing floodlight.

"Therefore," the board continues, "the significant factors are that: 1) reflective tape cannot be relied upon by the survivor or the rescuer as a locator device *unless* a positive light source exists, and 2) a survivor must use every device at his command to loudly and vividly proclaim his exact location when the tactical situation permits."

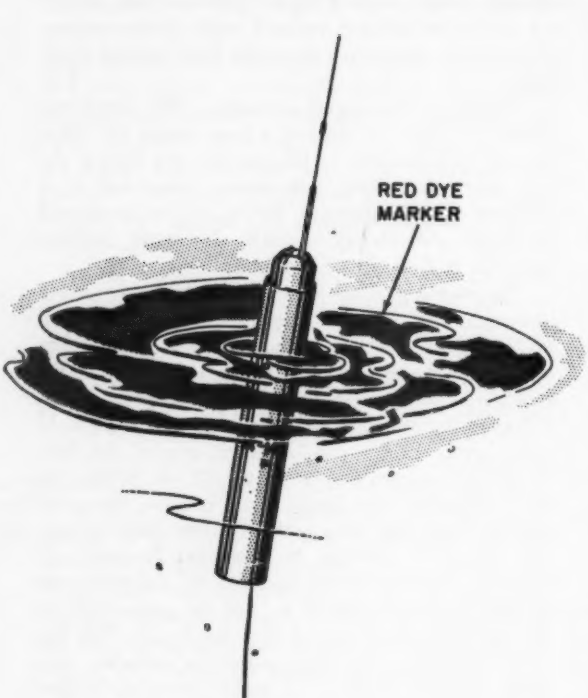
"The sighting of the survivor by the helo was enhanced by the optimum weather conditions, the trail of flight deck director's wands, the helo flood lights, the .38 cal. tracers and the night flare deployed by the survivor," the investigating flight surgeon states. "Pinpointing the survivor's position appeared to be most hampered by the inefficient use of the helo floodlights in that they were turned off during the final approach after initial use. Both the helo crew and survivor were then without night visual adaptation which, in addition to obscuring forms of objects, also interfered with sighting the reflective tape of the survivor's helmet as well as seeing the reflective painted surface of the rescue seat. The low moon was also a poor light source for reflection from these reflective surfaces. A major error was failure of the survivor to use his strobe light.

"The RAN in general used good headwork and deliberate action from the onset of his water survival situation. It was a poor decision on his part to assume that he was easily seen and, therefore, the strobe light not needed. Preoccupation with trying to reach and board the seat which was never in a good position led to a potentially fatal error in not disconnecting the raft lanyard from the Mk-3C.

"It is unrealistic thinking to assume that the survivor utilized the rescue seat as he did by choice rather than the prescribed way," the flight surgeon continues. "Again, poor night adaptation no doubt contributed to the seat not being dragged into the water so that normal mounting could be accomplished.

"Excellent underwater breathing characteristics were again demonstrated by the oxygen equipment," he concludes, "to the point that the survivor did not even appreciate its value until recounting the experience."

Notes from your Flight Surgeon



Communication by Sonobuoy

Accident reports indicate that non-ASW-oriented pilots and aircrewmen (including those of sister services and commercial airlines) are not familiar with the emergency transmitter capabilities of the sonobuoy. A listening device used in anti-submarine warfare, the sonobuoy can be used in a SAR situation for one-way voice communication from the water to aircraft overhead.

The sonobuoy is 42 to 48 inches long, cylindrical in shape, and weighs approximately 20 pounds. The hydrophone which is at the end of the 60 to 90 ft cable suspended from the buoy can be used as a transmitter. The buoy is equipped with a salt water activated battery with a normal life of from one to two hours; the battery voltage will not shock. The buoy has a self-scuttling soluble plug and sinks after the battery is expended.

You can locate the sonobuoy by its small white light and the red dye marker, both of which are automatically activated when the buoy enters the water. To use the hydrophone to talk to an aircraft overhead, simply go to the buoy, retrieve the hydrophone and speak into it. The hydrophone is some 18 inches below a "termination mass" on the cable. When you use the unit as a voice transmitter, all portions of the unit including the termination mass should remain under water except for the hydrophone itself.

VP, VS and HS aircraft carry sonobuoys. Channel 15 (172.75 VHF) is the accepted Emergency Primary channel to be used in a SAR situation. These aircraft have a listening and homing capability for sonobuoys. It must be remembered that the SAR aircraft has no way of talking to the survivor in the water but can acknowledge transmissions with standard wing rock, zoom, lights, etc.

The accompanying illustration shows the appearance of the buoy when ready for use as a transmitter.

Strobe Light Clip

AAR *recommendation*: That a clip be added to the pilot's helmet, so as not to interfere with the face curtain, so the pilot may attach his matrix/mercury strobe light above eye level to prevent blinding the pilot and to free the pilot's hands.

Comment: At the present time the Naval Air Systems Command Headquarters has this under advisement and has released a proposed bulletin to the fleet for evaluation.

No Rafts

ON A routine night ASW screening hop, the pilot aborted the first two hover attempts. While pulling out of the second hover, the pilot heard a loud noise. This was followed by severe vibration and an uncontrollable yaw. On crash landing, the plane immediately capsized, filled with water and in less than 3 minutes sank. The pilot and first crewman survived; the copilot and second crewman went down with the plane.

The pilot did not even attempt to activate the emergency release for the escape hatch next to his seat. Instead, he made his egress through the open window which is somewhat less than half the size of the hatch. When his modified PR-2A raft pack caught on the window, he had to relinquish it in order to get free of the plane. At the time of the accident the first crewman was not wearing his raft pack and did not have a raft available when he surfaced. In cold water, this could have led to severe exposure or even death before rescue.

Both survivors used their signaling equipment to attract attention and guide rescue craft to the scene. However, the pilot's failure to use the proper emergency exit and the crewman's failure to wear the PR-2A life raft caused both survivors to be without rafts in the survival phase.

None of the men in the aircraft had ever had a "dry run" using the emergency escape routes provided in the aircraft. "One can only guess at what effect the lack of training had on those who failed to survive," the investigating flight surgeon commented.

Recommendations in the AAR were:

- That all pilots and crewmen be regularly trained on egress from the SH-3A by actually jettisoning escape hatches, releasing seat belts and leaving the aircraft through their respective escape hatches.
- That a Dilbert Dunker type underwater survival trainer be designed and constructed to more closely simulate underwater egress and survival problems encountered in helicopter ditchings.

Misinterprets Signals

A BOMBARDIER / navigator's misinterpretation of hand signals was a contributing factor in a mid-air collision.

"Why did (the bombardier/navigator) make this mistake?" the investigating flight surgeon asks. "A review of his health record and statements from several pilots in the squadron, including (the pilot) with whom he did about 85% of his flying, makes the answer glaringly apparent. He probably could not see the signal well enough to interpret it. The best visual acuity recorded in his health record is 20/50 in the right eye and 20/25 in the left. He had been issued lenses which corrected his compound myopic astigmatism to 20/20, both eyes.

"The *Manual of the Medical Department*, . . . states unequivocally that for an NAO (B/N) with this visual acuity 'corrective lenses shall be *worn* at all times while flying.' The bombardier/navigator was not wearing his glasses the day of the accident. Apparently he never wore glasses while flying. There is a strong probability that this cost him his life."

A-4 Ejection

THIS A-4 pilot was faced with a decreasing altitude and airspeed problem while in the takoff phase of the flight. The airspeed had dropped from 170 kts to 140 kts and altitude could no longer be maintained. The pilot kept his right hand on the stick to maintain control of the aircraft and used his left hand to pull the secondary handle, which is the NATOPS recommended procedure when performing low level ejection. He described his body position as erect, feet on the rudder pedals and head back. Ejection occurred at an estimated 100 ft AGL, 140 kts with a slight sink rate of unknown magnitude. He described the ejection as smooth—very similar to an "elevator ride." He did not notice any windblast and did not tumble.

Opening shock of the parachute was mild and was not uncomfortable. Body position at this point was described as forward of the chute in the direction of travel. He had completed approximately one half swing and had almost reached the vertical position when he contacted the runway. His landing occurred on the overrun arresting cable at the end of the takeoff runway.

A slight scratch on his left hand was the only injury he received from the ejection and it is believed this resulted from the arresting cable on landing.—*From an AAR*

Clear signals - a two-way street between pilot and lineman.

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How long has it been since you've taken a long serious look at what should be the most important function of your division—*line safety?*

If you're a typical line division officer like myself, you're probably thinking: "Well . . . safety is pretty important, but with flying and my other collateral duties I really don't have time. Besides, we haven't had any serious mishaps—anyway, this whole area is taken care of by my line division petty officers."

I'm sure when you took over the job of line division officer, line safety, was high on your "priority" list of things to look into. Maybe it's about time for another hard look at the subject.

Safety on the line, as with anything else, depends upon people. So . . . let's take a quick look at two very important safety line supervisors.

Who, besides yourself spends more time on the line, knows the most about it, and in your absence is responsible for making sure all correct procedures are followed? You're right, your line P.O. He's the man who will see to it that all of the proper procedures are adhered to while you're busy with an all-officers' meeting or off flying.

Another very important man in your division is your line safety P.O. He should be responsible for the safety area of Line Division training. His other duties should include:

- Maintenance of a safety folder which includes all pertinent info.
- Displaying appropriate safety posters in the line working areas.
- Insure that fire bottles and other safety equipment are in satisfactory condition at all times.
- Report to the squadron safety officer for periodic briefings.
- Report all safety discrepancies to the line P.O. and the division officer. Be sure to include faulty towbars, tractors, and monitoring of driver's licenses.

In other words, your line P.O. and your line safety P.O. are the men to see in order to help you scrutinize your present safety program and give it a "shot in the arm" or even initiate a new one.

Now, let's get right into the meat of the most common line safety problems and ask ourselves:

"Has this ever happened on *my* line?" and then, "What can be done to make sure this doesn't happen again?"

Along this vein, it must be kept in mind that an effective line safety program not only involves the plane captains and their airplanes, but the pilots and all other support personnel in the line area.

In the old days there were just two standard phrases "No Smoking" and "Beware Propellers." We now have three more: "Beware Helicopter Rotor Blades; Jet Intakes; and Jet Exhausts." Jet intakes and exhausts, especially, can be very deadly when not respected properly by those working in the area.

How often do you conduct FOD walk-downs? When shore-based, most squadrons conduct FOD walk-downs every morning after quarters. Several FOD cans are strategically placed in the line area so that as FOD is collected throughout the day, it can be easily disposed of.

Aboard ship, the biggest FOD problem rears its ugly head on the day flying starts upon leaving port. Rags, canvas covers, paper cups, candy wrappers and other debris frequently have been seen flying by the jet intakes on that first launch out of port. Ramps and flight decks must be constantly policed for all types of FOD. Objects such as rags, lock wire, paper, stones, non-skid, tools and other foreign objects become projectiles in slipsteam or jet blast—which can cause extensive damage to aircraft engines and serious injuries to personnel.

Do you know that the maintenance shops account for all of their tools after completing a job? Granted, the line doesn't really use a great number of tools in its functions but each plane captain should be aware of the damage a simple screwdriver can do when left in the wrong place. Loose objects, such as rags, pencils and even paper-back novels can be often found lurking in the pockets of even the most conscientious plane captain. You're probably thinking right now of some of the objects you've carried on the line while supervising a launch. Leadership starts at the top —zooms to the bottom.

SAFETY

By LTJG Thomas G. Olson, VA-34

Checking the oil after turn up.

How about hot brakes? It's not much of a problem aboard ship. Ashore, hot brakes can be lethal. Personnel should be properly briefed on how to approach an aircraft with hot brakes, what to do, and more important—what *not* to do. A workable solution used by this squadron, when based ashore, is to designate a number of linemen as hot brake experts. Thoroughly trained in the art of recognizing hot brakes, and what to do with them, the expert carefully examines each returning airplane before it gets near the fuel pits. If the plane has hot brakes, the engine is shut down and the bird is towed to the nearest hot brake area for cool-off.

Do you have any problems with eager beavers? I'm not talking about the efficient, hard working conscientious plane captain, I'm talking about the type that is too eager for his own good and likes to cut corners in some areas like inserting safety pins while the aircraft is still moving. Generally, a little chat with said beaver will let him know that you're not particularly interested in speed at the expense of a half-done or unsafe procedure.

Ashore, fire extinguisher bottles are a very necessary part of all squadron line operations. But are they always present in your squadron whenever an aircraft is started, shut down, fueled or any time electrical power is applied? Most squadrons have standard extinguisher stations on the line. Each morning, a designated P.O. is required to inspect these positions and ascertain that the bottles are in place and ready for use.

Common to any line division is the problem of keeping the squadron aircraft clean and free of

A good in-port cleanup. Watch the rags. More than one misplaced or forgotten rag has turned out to be FOD.

Keeping ladders clean—a pratfall off a greasy ladder can be pretty serious.

corrosion, grease and oil. But, do you also have your men devote some of their energy to keeping associated equipment, such as ladders and stands just as free of oil and grease? A pratfall off a greasy ladder or stand can be pretty serious. A solution in this squadron is to first neatly paint all ladders and stands with the squadron color. After stenciling an aircraft side number to each ladder, the plane captain is not only responsible for the cleanliness of his aircraft, but the ladder as well. It works, especially when the pilots note ladder cleanliness on the plane captain's evaluation questionnaire—filled out after each flight.

Clean windshield—a must for any departing airplane.

Along the lines of fire prevention, it is necessary to conduct training lectures periodically concerning basic fire fighting techniques, the location of all fire fighting equipment assigned the line area and the proper method and place to report a fire. Included are the locations of alarm boxes; telephone numbers of the fire station, crash crew, squadron duty officer, flight deck control and the OOD.

Ever see a drop tank inadvertently jettisoned on the deck? Believe me, it dramatizes the need for keeping safety pins installed and *never, never, never* going under drop tanks, loaded ordance racks or even an unlatched tailhook. Short training lectures on all safety pins, including seat and landing gear pins, are easy to organize on rainy days—and are a very critical part of line division safety education.

Plane captain aircraft handling signals are another item that often comes under the scrutiny of line division safety. An improper or misunderstood line signal has resulted in many a crunch. The best publication available is the NATOPS manual of the aircraft model concerned. There's a standard signal for just about any situation that can arise on the line. Also, Appendix A of the new CVA/CVS NATOPS manual has several signals that linemen must be familiar with aboard ship.

Regardless of how clear a lineman's signals are, the pilot must see them. This means the lineman must be in the pilot's field of vision and out from under the blind spots of the aircraft. Next, the lineman must have the pilot's attention.

The plane captain must remember that he's the pilot's eyes during many of the post-start operations. He must insure that areas around speed brakes, flaps and tail hook are clear prior to giving the pilot signals of actuation.

Have you inspected each plane captain's ear attenuators and goggles lately? Both are simple pieces of equipment to service and keep in good shape. Without proper care, a lineman's hearing or vision can be seriously damaged or even destroyed.

One thing that must be constantly guarded against is skylarking or allowing linemen to become inattentive while working on the flight deck. For the most part, it is nothing more than just plain youthful exuberance mixed with a little boredom. The trick is not to suppress this exuberance—just redirect it. One line chief in the air wing did this by volunteering his skylarkers to assist in training the undermanned barricade rigging crew. Although there was grumbling at first, the improved rigging time and a couple of words of appreciation and praise, from the air boss to the squadron skipper, was all they needed. Grumbling stopped and a volunteer appeared once in a

while. A couple of months later, it really paid off when they had to rig the barricade for real one night. Wouldn't you know it? It was one of the squadron's own airplanes that had to take the net. The men did an outstanding job that night—and more importantly, they knew it. Now, they volunteer for the honor of being on the barricade rigging team. (See "Candid Camera" on centerspread— Ed.) Success, in some form, is a necessary ingredient to any redirection effort.

Yellow equipment, when based ashore, belongs to the line division and can be quite a headache. Only qualified and licensed personnel are permitted to operate yellow equipment. This doesn't make them skilled or cautious—remember, speed is the greatest cause of yellow equipment accidents. Most of the yellow equipment malfunctions can be traced back to an operator not using or knowing the correct operating procedure. Most of these problems can be solved by designating a Ground Support Equipment and Licensing Petty Officer and backing him 100 percent. Much of the moving accident hazard can be avoided by restricting riding (i.e.: tractors, shop mules) to the permanent seats provided for that purpose. Along these same lines, only qualified brake riders or pilots should ride in an aircraft while it's moving. At times a line division officer may have to explain that the wing or drop tank is not the place to ride while an aircraft is being moved.

Considering your own line division, undoubtedly you have seen many of the problems discussed here—and most likely have more and better solutions. That's as it should be, since each squadron has its own unique combination of personalities and problems.

The Line Division CPO—backbone of any Line Division.

The intent of this article is to get you and me, as line officers, to take another look at each and every unsafe practice and then see what we can do to prevent it from recurring. You won't be able to do it all alone. Use the help of your line P.O., your line safety P.O. and each member of your division. At times the going will be rough but with proper direction and leadership, you can make your Line Division not only the most efficient division in the squadron but above all, the safest.

Checking the tailhook holddown mechanism before flight. The plane captain is the pilot's eyes during many post-start evolut

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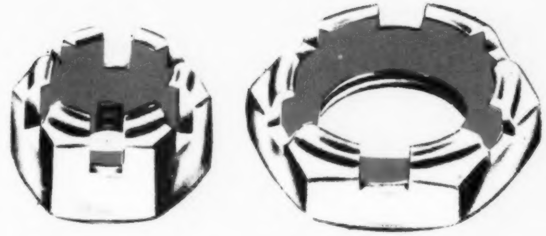


Several cases of throttle linkage separation with attendant power loss have occurred in aircraft because of cotter pin omissions and subsequent nut and bolt losses ("Causes and Cures for Throttle Disconnects and Jams," Sept. '65 APPROACH).

After evaluation of the problem and possible cures, NavSysCom has directed replacement of all AN 310/320 nuts in throttle linkages of all aircraft with the issuance of General Airframe Change 3. Replacement nuts MS 18725 and MS 18726 are castellated, also requiring a cotter pin for maximum safety, but have a vibration damping insert (see illustration). This insert, in effect is an additional safety feature which will prevent nut spin-off in the event a cotter pin is inadvertently omitted. A recent study of mishaps covering a 3-year period revealed 21 proven cases of nut spin-off and five cases suspect.

Use of these new nuts is in no way meant to replace cotter pins. Change 3 cautions that reuse of either castellated nuts or cotter pins is prohibited. The directive affects Maintenance and Instruction Manuals, Illustrated Parts Breakdowns of Power Plants and related systems for all naval aircraft in which AN 310/320 nuts are used for throttle control systems.

Federal Stock Numbers for the new nuts are as follows:

MS	17825-3	9Z	5310	785	1755	
MS	17825-4	RM	5310	961	8390	A110
MS	17825-5	2R	5310	900	9421	
MS	17825-6	9Z	5310	961	8391	
MS	17825-7	KZ	5310	961	8392	
MS	17825-8	RL	9690	961	7825	
MS	17826-3	9Z	5310	066	4289	
MS	17826-4	9Z	5310	266	3911	
MS	17826-5	9Z	5310	961	8393	
MS	17826-6	9Z	5310	961	8394	
MS	17826-7	9Z	5310	961	8395	
MS	17826-8	9Z	5310	961	8396	

Although this change is to be incorporated as soon as possible, not to interfere with flight operations, but not later than next progressive rework, common sense dictates replacement at critical points such as fuel controls, carburetors, etc. at the time of disconnection. Other areas such as wing and airframe containing rods, cables and bellcracks may be serviced during the latter period.

Strike followed power loss and ejection of the pilot. Mute testimony of a throttle disconnect.

NOTES

and comments on maintenance

Oil Analysis Saves

HERE are a pair of instances concerning periodic oil sampling of J57 engines in F-8s which reflect the merits of the Spectrometric Oil Analysis program. Major R. H. Schyltz, MARTD, Andrews, tells the story:

While deployed at MACS Beaufort we received a phone call from Pensacola stating that an oil sample submitted on one of our J57 engines contained high iron, aluminum and copper content. We were requested to submit another oil sample for analysis prior to the next hop on the aircraft. The aircraft happened to be in the air and on the way to Pensacola on the first leg of an out and in flight. Pensacola Operations and the oil analysis branch were notified and the aircraft was grounded upon arrival. Subsequent oil analysis and engine inspection revealed an immediate need for an engine change, which was accomplished.

The most significant facts of this discovery were:

The oil sample had been submitted on Thursday.

The aircraft subsequently flew 2 flights on Thursday, 4 flights on Friday and 1 flight on Saturday to Pensacola after the engine problem initially appeared in the oil sample.

During these 7 flights the aircraft did not have a discrepancy on it and the pilot indicated that the engine was functioning properly when he arrived at Pensacola with no indication of any trouble.

After replacement of the contaminated oil and cleaning of the oil filter the engine was run for different intervals of time and samples again taken. (Metal content in the oil and metal filings in the oil strainer were of sufficient quantity that an engine failure was imminent.)

The second situation involved an F-8B received from PAR. From the 2nd to the 29th of the month the aircraft flew 53 hours before an oil sample submitted on the 27th was discovered to contain high iron and aluminum content. The aircraft was grounded and the oil system purged and strainers cleaned. Subsequent oil samples taken with the new oil revealed extremely high iron and copper content and the engine was recommended to be removed for overhaul.

"This all points to the fact that this oil sample analysis program seems to be well worth its money. A few years ago when we didn't have this program we probably would have lost a couple aircraft due to engine problems. Now we just lose a few flight and man-hours but we still have an airframe."

Note to Flight Deck Directors

MOVEMENT of flight deck directors while directing aircraft at night can adversely affect the pilot's ability to determine his actual speed.

Experience on some carriers indicate red moonlights and red floodlights illuminate the flight deck to such an extent that details are easily distinguished. Aircraft and personnel movements are greatly facilitated as a result. In most cases a limited movement of the director does not affect the pilot's references for taxi speed. But there are areas and times where the director must remain fixed to enable the pilot to positively establish his direction and speed over the deck. These include: approaching No. 4 catapult; during all catapult hookups; and when taxiing forward on the bow.

Directors should keep their movements to an absolute minimum when directing aircraft at night. In the critical areas just mentioned—remain stationary. Prevent a crunch and possibly more serious damage.

No Brakes Signal—Hook Down

CARRIER pilots experiencing brake failure or control problems on deck signal this difficulty by dropping the tail hook. The director controlling the aircraft, in turn, signals for chocks, tractor and tow bar.

Unless chock walkers are present at the time of failure, delays in chocking the aircraft can be expected. Blue shirts and chocks are pre-positioned on the flight deck to reduce delays, but in view of the distance involved, there will be short intervals before chocks are securely in place.

Pilots can gain additional assistance by trans-

mitting their problems to Pri-Fly. This is particularly important in cases of hook malfunctions that are easily misinterpreted by the flight deck crew and lead to foul deck waveoffs and unnecessary delays.

3-M Vans

VANS designed specifically for 3-M operation are now appearing on the aircraft maintenance scene. These vans have been designed as a result of fleet experience with earlier equipment. For instance, the wheel base has been reduced to 104 inches to improve handling characteristics when operating in close proximity to aircraft.

Furthermore, windows have been added in the side and rear panels of the van to allow complete visibility and reduce the possibility of a crunch. Automatic transmissions facilitate the stop and start delivery task and reduce operating costs. Headquarters, Naval Material Command reports delivery of 357 vans of this type is expected to be completed this month.

We Never Make Mistakes

AIRCRAFT maintenance, very much like the field of journalism is fraught with mistakes—mostly little ones, but as troublesome as the big ones. Why? —Because almost anybody can take care of the details.

Take a major discrepancy—everybody gets into the act—the top mechs, the engineering chief, the maintenance officer and possibly a tech rep and before you know it the fix is on. But take an item like a cotter pin, securing a panel, a gas cap, or an oil filler cap—these are left for the less qualified types because *anybody* can do *that!* Trouble is—somebody doesn't and a mistake is made!

In the printing game, words like isochronous seldom are mispelled—somebody—proofreaders, editors or technical reviewers will look it up for spelling and meaning—it's checked out. But take a word like misteak, it gets by—everybody knows how to spell *that!* Do they?*

*Mistake and *misspelled* were misspelled in the foregoing passage—get the point? *Isochronous*—Equal length, interval, duration, etc.

FOD FACTS

CAN You Identify These Potential Sources of Foreign Object Damage?

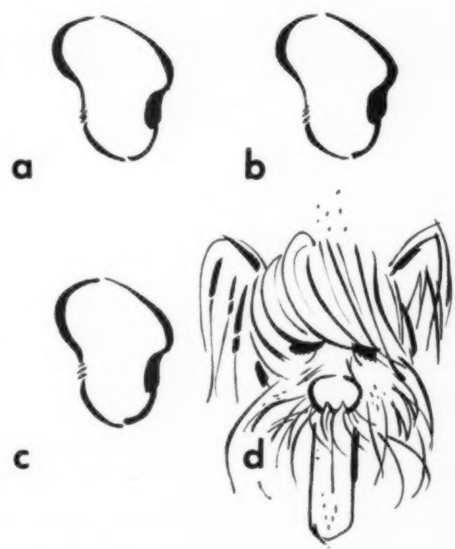
a. The object is a hole in a pocket through which loose articles can be lost in the vicinity of the aircraft.

b. Although this object bears a strange resemblence to the artist's portrayal of a hole in the pocket, it is actually a blob of grease or mud. Sometimes found on shoes, it holds bits of wire, cotter pins, pebbles, etc., which may be tracked near or into the aircraft.

c. A rag or handkerchief, this "readily identifiable" object has been known to bring small articles with it when brought forth from a pocket. Speaking of pockets, it's a good idea not to keep loose articles in shirt pockets and to use clips to hold pencils, pens, rulers, . . ., in place.

d. Our apologies to FOD hunters—we must confess that large shaggy dogs actually have little to do with generating foreign object damage. But FOD is no shaggy dog story. FOD is a serious threat. FOD kills.

—Adapted from MAG-26 "Safety Raiser"



Snubber on input side of tee-fitting incorrect

Snubber on output side of tee-fitting correct

S-2 Murphy

INVESTIGATION of an incident in which an engine inadvertently autofeathered on a night bolter disclosed a Murphy which may have been a contributing factor. The Murphy discovered ironically is the result of a snubber Murphy which was corrected by S-2 ASC 381.

ASC 381, among other things, redesigned the fittings on the torque pressure snubber so that it was impossible to install the snubber backwards or improperly. The new snubber, PN 44D-2-01N, was then put into the supply system and all old type snubbers were removed. Therefore engines without ASC 381 incorporated are forced to use the new snubbers. It is then necessary to equip the new snubbers with reducers in order to install them in the torque system.

In this case the reducers make it possible to install the snubber on the input side of the tee-fitting (photo left) which will then dampen the torque pressure to both torque pressure transmitter and autofeather torque sensing switch. Photo right shows the correct installation of the snubber between the output side of the tee-fitting and the line going to the torque pressure transmitter.

To insure proper installation, reference should be made to NavWeps 01-85SAD-2-6, page 6-47, Fig. 6-23F. Additionally all engines built up by Intermediate Maintenance Activities should be inspected to insure incorporation of all applicable ASC prior to release to any other activities.

CDR R. H. Nickerson,
CO, VS-26

A-4—E-1B—S-2 Murphy

O&R, NAS Quonset Point reported numerous malfunctioning anti-exposure suit vent blowers, MS 22053-4 for A-4, E-1B and S-2 series aircraft. Investigation revealed that blower wires to pins A and B of receptacle MS 3112E-14-SP were cross-connected causing reverse airflow.

Although this condition was discovered in new equipment delivered by the contractor, this alert is passed on to users in the event similar malfunctions are experienced in the field. A functional check to determine proper rotational direction is recommended.

CH-46A Murphy

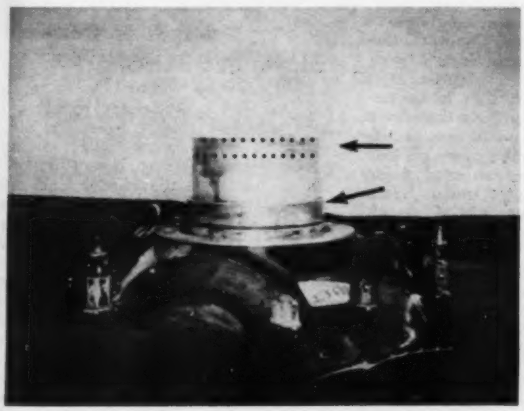
DURING runup of a T58-GE8B engine installed in a test stand the oil cooler ruptured.

Troubleshooters found the oil cooler one-way check valve installed backwards.

Check valves are marked by an arrow indicating direction of fluid flow. If not marked thusly, reject the valve. A new valve is far less expensive than a new oil cooler, not to mention the labor involving replacement.

E-1B Prop Murphy

DURING check and test of an E-1B propeller assembly, reinforcement sleeve PN 524329 was found installed on the outboard end of the rear spider shaft vice the inboard end. (See photo.)



The aircraft involved had been inducted into PAR from a fleet activity with this condition. Squadrons using 43D51-341 propellers take heed.

Rotor blade installed backwards resulted in blade failure (aft of spar) rotor engagement.

Only the BuNos Change

SOMETIME back, (APPROACH, March '63) was reported that all four of the SH-3A's tail rotor blades could be and were installed backwards. Then the work had been checked by qualified personnel but went undetected until a casual observer discovered the error on the hangar deck. The safety officer at that time reported, "It is conceivable that this mistake could happen again." It did.

This time on an SH-3A only one of the blades was installed backwards. Again, qualified personnel installed the blade. Again, the quality control inspector failed to detect the misinstallation. This time there were no casual observers around and the test pilots failed to detect it. So, as you've probably guessed, a turnup was attempted. Upon rotor engagement the airframe began to vibrate violently. The backward blade failed adjacent to the spar and a portion of the blade aft of the spar separated striking the aircraft at station 640 and continued forward beneath the aircraft coming to rest 140 ft away.

"This Murphy points up the need for renewed and continued emphasis on proper quality control inspections and thorough pilot preflight," stated the squadron skipper. What more can you say?

***If an aircraft part can be installed incorrectly, someone will install it that way!**

Letters

Ear Plugs

FPO, New York—In the September, 1966 issue of APPROACH in "Letters to the Editor" there was a comment about the use of ear plugs in flight. The editor's reply, I feel, may have left the impression of there being no use for ear plugs in an in-flight situation.

I quite agree that tight-fitting ear plugs under a helmet that cannot be removed may permit potentially dangerous pressure changes in the external ear canal between ear plug and ear drum when the ambient pressure undergoes a change. A phrase in the final sentence in the reply, however, may be misleading to many persons: "the danger of diminution of intensity of actual communication as well as static" by use of ear plugs. It is true that all amplifier output will be reduced by attenuation. However, there is a beneficial effect of ear plugs when used in a noisy environment. The enclosed authoritative sources agree that the attenuation of both background noise as well as signal or communication sounds results in better reception or intelligibility of signal or speech. If the communication sound can be increased as in an intercom or radio, then this beneficial effect is enhanced.

In certain models of aircraft where large pressure changes are not encountered or where helmets are not worn continuously, such as VR, VP or the C-45J, the use of standard ear plugs will improve communication within the aircraft or intercom and by voice as well as communication with the ground. Where the danger of barotrauma exists or the irritating effect of standard ear plugs under a helmet is important, then dry cotton may be used to produce some attenuation without discomfort or danger.

LCDR W. W. HODGE, MC
SMO, USS SHANGRI-LA (CVA-38)
LT I. W. JOINES, MC
LT C. R. PETERS, MC
CAW-8, EMBARKED

You state your case very clearly and you have a good point. Ear plugs reduce the total intensity of noise reaching the ear drums. It is true, as pointed out, that in an environment with much background noise, *speech discrimination* is often improved by the use of ear plugs which reduce the total noise intensity. With a quiet noise background, this enhancement of speech intelligibility is not obtained.

We are unable to reprint your quoted source documentation because of copyrights but will list the the titles for general information: *Human Engineering Guide to Equipment Design*, McGraw-Hill, 1963; *Human Factors in Air Transportation*, McFarland, McGraw-Hill, 1953; *Aerospace Medicine*, Armstrong, Williams & Wilkins, 1961; and *Aviation Physiology*, Evans, 1963, distributed by the University of Southern California Safety Course.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

Gloves and Burns

FPO, San Francisco—As a flight surgeon with a helicopter squadron I have observed several helicopter accidents. In each case the pilot and copilot escaped serious injury but received burns of the hands. They all wore gloves and all had their sleeves down except for a cuff which may have allowed a separation between glove and flight suit at the wrist.

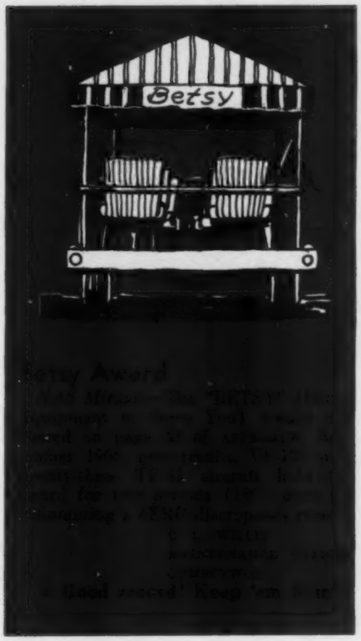
My conclusion is that though the glove protects, it can act as a funnel and direct burning liquids, etc. down the glove and then maintain them against the wearer's hand, causing more severe burns. Have you received any other similar observations? Perhaps longer gloves or shorter, wrist length gloves and/or internal restraining devices at the wrist would prevent this danger. In the Nomex flight suit which fastens at the cuff, the gloves can be secured if the pilots will wear the suit properly. This is not possible in the poplin flight suit.

LT WILLIAM F. LYON, MC
HMM 161

• Most of the reports received on flight glove difficulties in survival situations seem to concern the gloves' slipperiness when wet. The new Nomex glove should go a long way to solving current glove problems. Made of fire-resistant polyamide stretch material and a commercial grade of washable leather, it provides both fire protection and good gripping capabilities when wet. More to the point of your observations, it incorporates an elastic-backed, cinched type wrist.

Cognizant personnel in the Naval Air Systems Command Headquarters inform us that present plans call for procurement of 5000 pairs of the new Nomex glove for fleet introduction. These gloves will probably go to Southeast Asia. Plans call for the Air Force Simplex glove to be used as an interim measure pending issue of the Nomex glove in greater quantity under Defense Supply Agency procurement. The Nomex glove, which has already passed Navy evaluation, is being issued as a Tri-Service supply item and apparently is undergoing further evaluation by the DSA.

The Naval Air Systems Command Headquarters is giving top priority to the glove problem and is trying everything possible to expedite delivery of the Nomex glove in quantity to the fleet.



Birds Strike Again

Midway Island—As you know, we have a problem with the bird population here. We have reams of information about birds striking both propeller driven and jet propelled fixed wing aircraft.

We have been unable to locate anything about bird strikes with rotary wing aircraft. We have checked through APPROACH back to 1961. If you can send us anything on the subject or refer us to another publication we would appreciate it.

LT DANIEL R. TOLENO
ASO

• Your letter on the "Goons Strike Again" from Midway Island crossed the desk coincidentally with another related article by the Army.

Few places are plagued with bird strikes of such magnitude as you folks out on Midway and Wake Island experience.

The FAA and the Army both have undertaken the task of compiling exact figures concerning bird strikes by both civilian and military operators alike.

Ft. Rucker, Alabama may be able to assist you further in your efforts to research the problem.

Checker Needed?

USS Nowhere—Aboard ship an airplane is carefully preflighted by the plane captain and inspected by the pilot before starting. As the airplane taxies onto the catapult and tensions out for launch it is visually checked over by a topnotch maintenance petty officer who gives the catapult officer a thumbs-up before he will launch it.

This has without question saved many an airplane and pilot from an accident.

Ashore, aircraft are preflighted and the line personnel look it over as it taxies from the line. It then taxies from distances up to two miles, makes a high power turn up and launches without further inspection. Isn't the Navy missing a bet by not stationing a "checker" at the takeoff end of runways for a last minute inspection? Wouldn't it prevent some cracked struts, blown tires or even accidents?

I believe it would. Pilots would appreciate seeing a thumbs-up by a knowledgeable maintenance specialist just before releasing the brakes for takeoff. They would appreciate, even more, a thumbs-down when something was wrong that was not or could not have been detected from the cockpit.

A PILOT
F.P.O. N.Y.

• Your suggestion of a prelaunch check by a competent maintenance type petty officer just prior to taking the duty has merit.

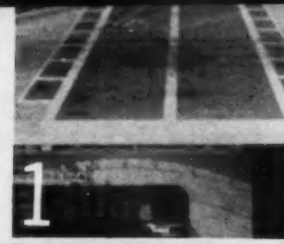
In researching your ideas we found that this type of inspection is being performed by the Air Force at Perrin AFB. The men in blue started this service last year and ran a full account of the intricate workings of the system under the title "Last Chance Inspection," in the September 1965 issue of "INTERCEPTOR."

An interesting side effect reported by the wing at Perrin was the definite improvement in jet aircraft cleanliness. Since the prelaunch inspectors are selected from the maintenance support group, it seems that the word has filtered back and extra care is now taken to insure that no residual fuel or oil, etc, remains in the engine bay that may be mistaken for a leak.

A copy of the article has been sent to you for reference.

Vol 12 **approach** No 6

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.



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DEPARTMENTS

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CREDITS

Cover: A-4s in Constant Vigilance, Painting By R. G. Smith, Courtesy of Douglas Aircraft

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Do You Resist Progress?

You don't think so? Well, don't be too sure. Human beings who don't resist progress are rare exceptions. The plain fact is that most of us do.

Progress is a wonderful thing—as long as it involves somebody else. But when a new idea crops up in your unit, how do you react? Do you step forward eagerly to appraise its merits with an open mind? Or are you apt to draw back—perhaps unconsciously—and reach for something to kill it?

Resistance to change is almost instinctive. Doing things differently would upset our comfortable habits of thought and action. It would create the need for thinking, planning, and making new decisions. And what if those decisions happened to be wrong?

Change always involves some risk—the risk of failure, the risk that things won't turn out as much to our liking as they are now. We're familiar with our present problems. But who knows what our problems would be if we started making changes?

Are you still confident you don't resist progress? Well, just for fun check the following list of expressions. See if any of them sound familiar.

✓

We Tried that Before

Did you? Precisely this idea or merely something like it? And how was it executed? Don't be too sure that ideas which were tried and didn't work are bad ideas. Many a terrific idea has failed simply because it was poorly executed.

✓

Not Practical for Operating People

What's different about operating people? The man who makes this comment without specific, sensible reasons is merely throwing mud at the proposition.

✓

Has Anyone Else Tried It?

This is a good question—if it's asked for the purpose of obtaining information. The trouble is that it's so often asked by someone groping desperately for a reason to say no.

✓

We Don't Have the Time

This is the favorite comment of people who've planned something and don't want their plans changed. If they really want to change things, it's amazing what can be accomplished in a very brief period.

✓

We Did All Right Without It

The fellow who opposes a new idea for this reason is really grasping at straws. But you've heard it. So have I.

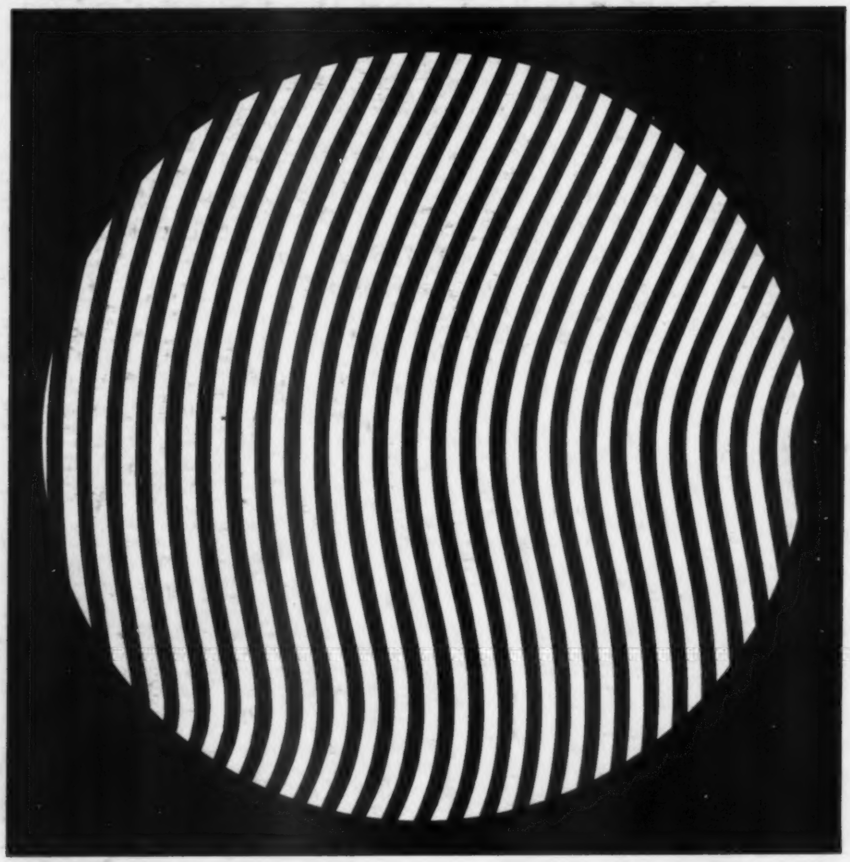
✓

Don't be Ridiculous

A comment designed to end discussion before it begins. It not only kills the idea in question, but also cautions the man against suggesting any others.

Under the proper circumstances, some of the expressions quoted above make excellent sense. That's precisely what makes them so damaging. Wrongly used, they sometimes stop a valuable idea dead in its tracks.

Contributed by VA-106



'I file VFR.
There is always a

HOLE.'

HIS QUOTABLE LAST QUOTE

OTE